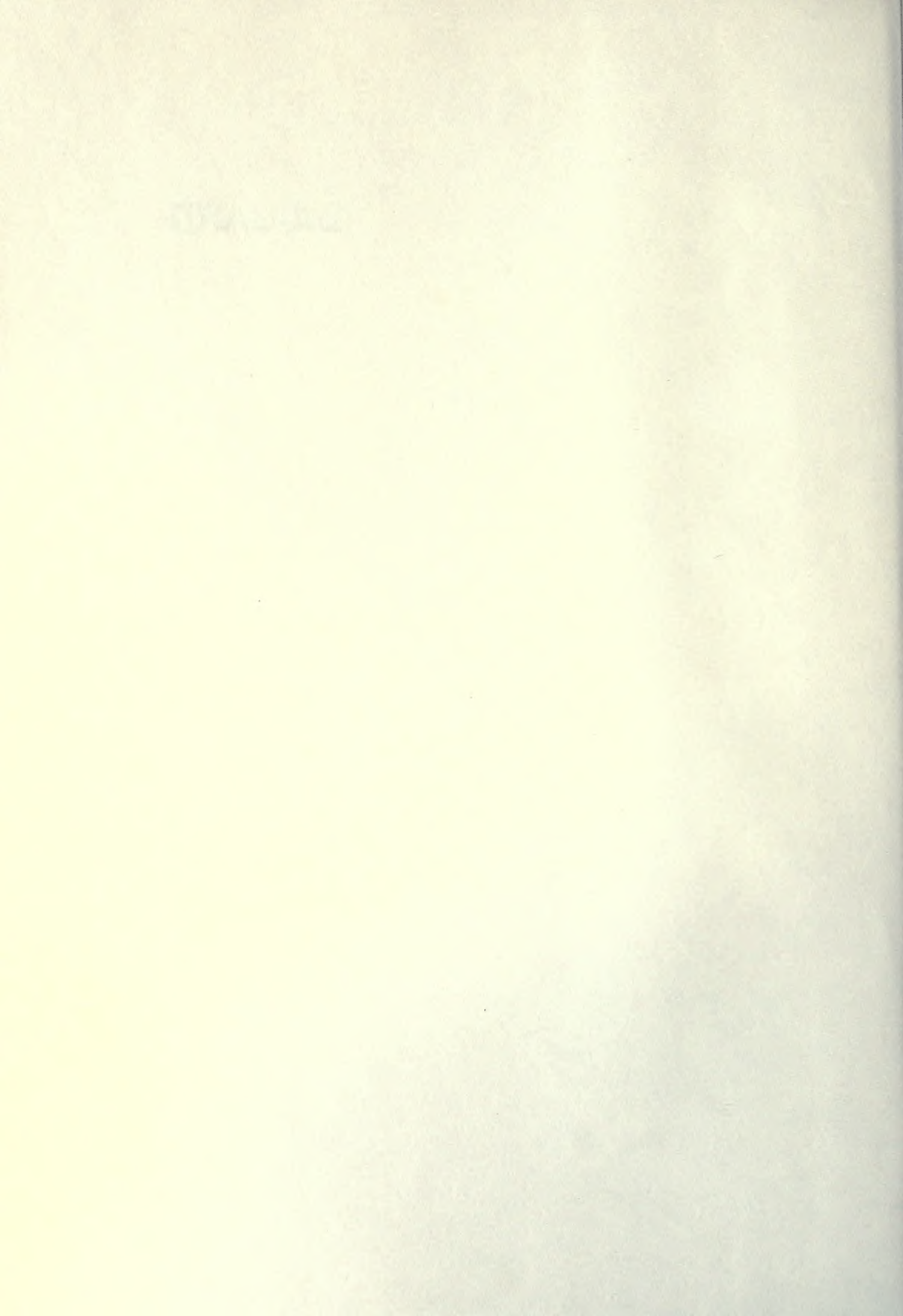


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ELECTRIC RAILWAY JOURNAL

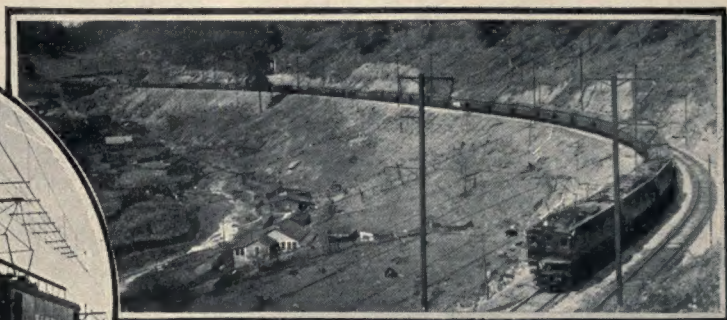
aw-Hill Publishing Company, Inc.

MARCH 3, 1928

Twenty Cents per



Nineteen Years and not an hour's delay on the Canadian National-Grand Trunk Railways where six 67½ ton Baldwin-Westinghouse locomotives are employed for service in the St. Clair Tunnel.



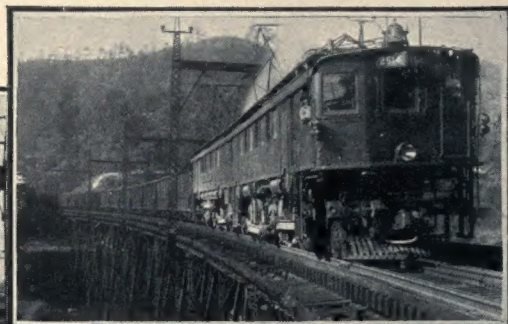
Operating Costs Reduced 45% on the Virginian Railway



World's Most Powerful Motor-Generator Locomotive Operating on the Great Northern



41 Electrics Reach 51,250,000 Mileage on the New Haven in 20 Years



Twelve Electric Replace 50 Steam Locomotives on the Norfolk & Western

THROUGH electrification of railroads, Westinghouse has made many noteworthy contributions toward the solution of transportation problems. These include the electrification of terminals, yards, and the main and suburban lines of the leading transportation systems in the United States and also those of foreign countries.

Following are a few of the railroads in the United States served by Westinghouse:

The Pennsylvania Railroad
The New York, New Haven & Hartford Railroad
The Long Island Railroad
The C. M. & St. Paul Railway
The Erie Railroad
The Great Northern Railway
The Virginian Railway
The Canadian National-Grand-Trunk Railways
The New York, Westchester & Boston Railway
The Boston & Maine Railroad
The Illinois Central
The Southern Pacific Railroad



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East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries

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Vol. 71
No. 9

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Better Maintenance

COMING!

COMMENTING on American electric railway maintenance methods a German engineer recently remarked "They are wretched. You don't maintain your cars; you repair them. You let the parts wear out and then replace them without giving proper attention to fits or clearances."

Is the German engineer right or wrong? What are some of the bad practices in railway maintenance? What are the views of the manufacturers who furnish the equipment?

With these questions in mind the JOURNAL laid plans for this year's Annual Maintenance Number. It asked the manufacturers to discuss some of the railway maintenance practices which come under their observation.

Frankness is the keynote of these articles. Uncovering bad practices is the first step toward improvement. Every electric railway maintenance man and executive will find food for thought in this year's Annual Maintenance Number. The date is March 17. Watch for it!

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Electric Railway Journal
Electrical World
Electrical Merchandising
Radio Retailing
Construction Methods
Electrical West
(Published in San Francisco)
American Machinist—European Edition
(Published in London)



BETTER RAIL, BETTER TRANSPORTATION

A soft answer turneth away wrath but—

a rough track
turneth away traffic.

A word to the wise
is unnecessary.

*Complete details on the complete line
—get them.*

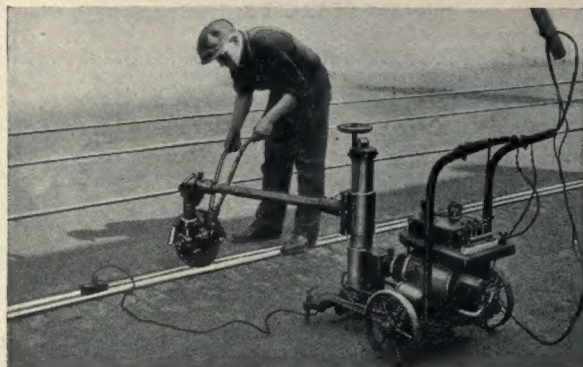
Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

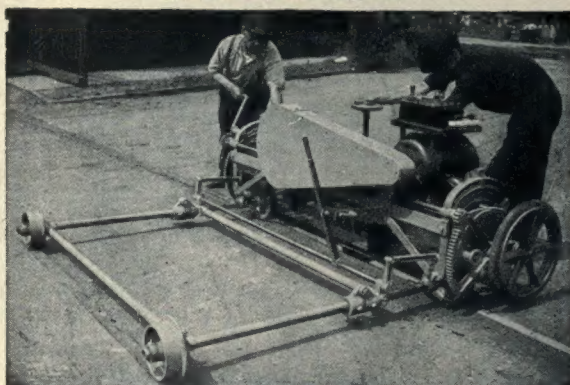
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Chester F. Gailor, 30 Church St., New York.
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
H. F. McDermott, 208 S. LaSalle St., Chicago
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Ⓢ 2343



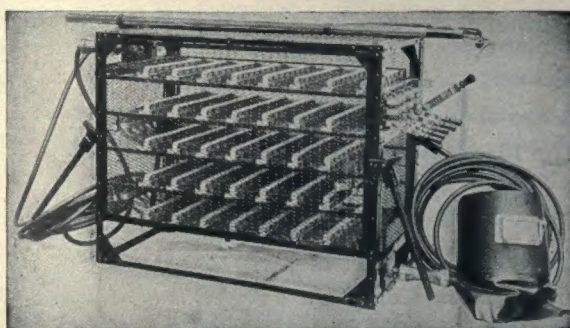
Eureka Radial Rail Grinder



Vulcan Rail Grinder



Reciprocating Track Grinder



"Ajax" Electric Arc Welder

BETTER RAIL, BETTER TRANSPORTATION

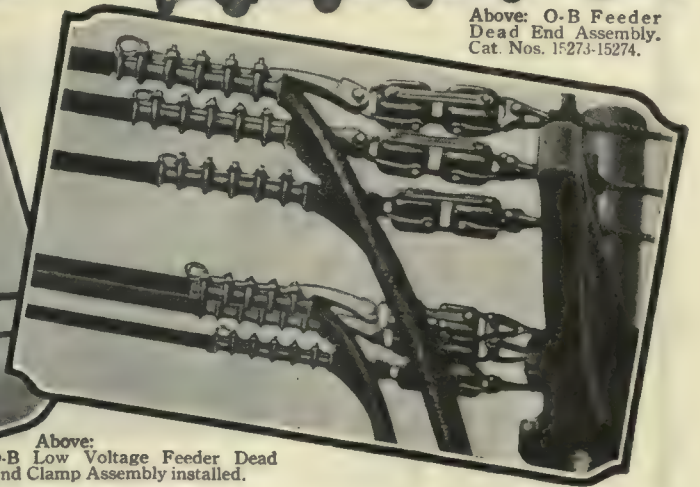
DOLLARS AND SENSE!



Above: O-B Feeder Dead End Assembly. Cat. Nos. 15273-15274.



Above: O-B Low Voltage Feeder Dead End Clamp Assembly installed.



New O-B Feeder Clamp Saves Time and Materials Does a Neater, Better Job



Considering that only 1% saved in operating expenses adds nearly 20% to net income, the importance of taking advantage of many possible small savings is readily apparent. O-B Low Voltage Feeder Cable Clamp Assemblies afford another opportunity to cut operating costs.

Note These Advantages

1. Eliminates serving, soldering, and taping of cable at dead ends.
2. Cuts installation time 30% or more.
3. Prevents wastage of three to four feet of cable on each dead end.
4. Is compact—ladders are unnecessary for installation.
5. Affords a neater, more durable job.



Strain or Semi-Tension Assembly

The new O-B Strain or Semi-Tension Clamp Assembly makes it possible to turn corners on two or more poles without dead-ending the feeders in both directions. Cat. Nos. 15343-15344.

ONE-THIRD to one-half the usual time is required to dead-end low voltage feeders, and from three to four feet of cable is *saved* on each dead end, with the use of the new O-B Feeder Clamp Assembly.

In addition to these dollars and cents savings in labor and materials—amounting in many cases to \$7.00 for each dead end—the new O-B Feeder Clamp Assembly provides additional insulation. It *also* affords a more durable, trouble-free, and better appearing job.

All need of serving, soldering and taping cables at dead ends is eliminated. Feeders may be cut off and dead-ended in the clamp. Or, the cable can be carried through for jumper connection to another feeder either below or on either side or above the clamp. Exhibited at the A. E. R. A. Convention, this New O-B Feeder Dead End Clamp Assembly attracted the interest and favorable comments of scores of overhead men.

Ask your O-B Salesman today for *complete* details. Or write for Folder No. 145-B. Address

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
761L

Ohio Brass Co.

NEW YORK CHICAGO
PHILADELPHIA

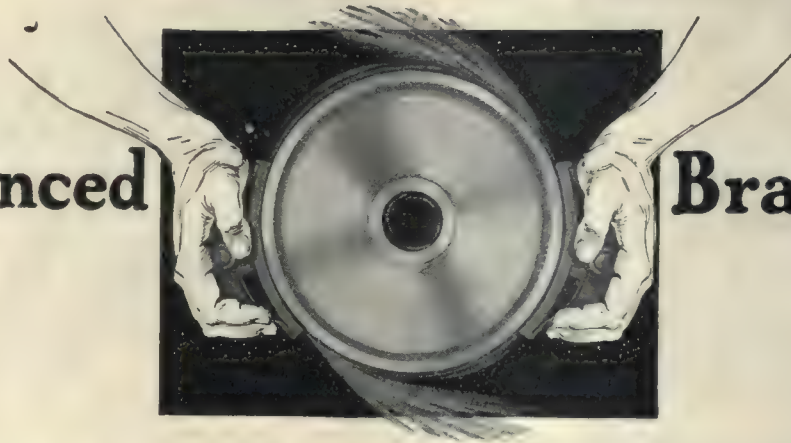


PITTSBURGH ATLANTA CLEVELAND
ST. LOUIS SAN FRANCISCO LOS ANGELES

PORCELAIN
INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING
MATERIALS
VALVES



Balanced



Braking

In line with modern principles

Higher rates of retardation are demanded as a part of the program of speedier suburban and street railway service. With two brake shoes per wheel instead of one, the clasp brake is admirably suited to producing maximum retarding effect, with minimum strain and wear on truck and journal parts.

Balancing the heavy braking forces on opposite sides of the wheel has many advantages

- | | |
|--|--|
| 1. Less journal box wear. | 5. Divides energy absorption between two shoes, thus reducing heating effect from brake application. |
| 2. Permits wheel to follow freely, vertical inequalities in track. | |
| 3. Makes use of flanged brake shoes practical. | 6. Reduces frequency of brake shoe replacements on the car. |
| 4. Higher co-efficient of friction. | |

AMERICAN STEEL FOUNDRIES

NEW YORK

CHICAGO

ST. LOUIS

American Multiple Unit Clasp Brake



TO PUT YOUR 1928 TRACK PROGRAM ON A PRODUCTION BASIS—

—ask yourself these questions

1. *Construction operations:*

- (a) Are they all necessary?
- (b) If necessary, can they be improved?

2. *Parts and materials:*

Are any parts through lack of uniformity slowing up labor operations?

3. *Time:*

Can man-hour time per operation be reduced by using labor saving devices and machinery?

4. *Design of materials:*

- (a) Is the design wasteful of materials?
- (b) Can lower rails be used?
- (c) Are joints modern and long lasting?
- (d) Are ties a compromise with custom or are they a well thought out, uniform product—designed to save labor and materials, with no sacrifice of bearing under rail and on ballast and sub grade?

5. *Design of Track:*

- (a) Does the track design meet the requirements of higher quality and lower costs by economizing material and labor?
- (b) Does the design adapt itself to the complete use of labor saving machines?
- (c) Has the design immediately available labor saving equipment for all operations?

On any program of a mile or more of track,
Twin Tie production methods can be applied.
A conference with our engineers will in no
way obligate you.

THE INTERNATIONAL STEEL TIE CO.
Cleveland, Ohio

STEEL TWIN TIE TRACK

THE BASE OF MODERNIZATION

Build "good will" with Modern Cars

Cars recently built by this company for several properties have brought forth much favorable comment from the public in the various localities. The riding comfort has been especially noted. This is a feature of the modern car that goes far to increase good will and build patronage.



CUMMINGS CAR
AND COACH CO.

111 W. MONROE ST.
CHICAGO, ILL.



AN INSPECTION TOUR
OF THE WELL-EQUIPPED
CAR

A free publicity service—

HUNTER-KEYSTONE ILLUMINATED SIGNS

Use clear, clean, readable illuminated signs on your cars to advertise your service, establish your routes and facilitate re-routing.

Hunter-Keystone Illuminated Signs "tell the public where you're going" night and day. They consist of specially printed roller curtains which are turned or regulated by a small crank handle so that any one of the ten or more destination names may appear. They are mounted in sheet steel cases or they may be built into the car structure.



Hunter-Keystone Signs

Let us send you complete information about Hunter-Keystone Illuminated Signs and about other Keystone Equipment found in the modern well-equipped car.

Write for ESSCO Catalog No. 7.

Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District Offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 85 Broad St., Boston; General Motors Bldg., Detroit; 313 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES Co.

MANUFACTURER OF RAILWAY POWER

AND INDUSTRIAL ELECTRICAL MATERIAL





*The Capital of
Rhode Island is
one of the many
cities now enjoying
Safety Car benefits*

Selling A Better Service - - - - at an economic gain

Safety Cars are modern cars, whether they be new cars, or old equipment adapted to Safety Car Devices Control.

Safety Cars are modern cars, inasmuch as their feature of concentrated control permits the operation of more cars, at faster schedules, at no increase over old operating costs.

Safety Cars stimulate public good-will by affording better service, at better schedule speeds, which means increased patronage.

Safety Cars do Sell A Better Service at an economic gain, which accounts for their nation wide acceptance.



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

*"We make the Safety Car Control Devices
which make the Safety Car."*

Guy A. Richardson

Analysis of the



“The new Twin Coach type bus, like the street car, utilizes for passenger carrying 100 per cent of street space occupied, has quick get-away because of its adequate power facilities and has added reliability of service due to its twin motors. Also like the street car, it permits a free circulation of the load. These advantages over the older type buses influenced the Chicago Surface Lines in adopting the Twin Coach as its standard for feeder bus service.”

GUY A. RICHARDSON,
Vice President, Chicago Surface Lines.

The MOST SIGNIFICANT VEHICLE
in 1938 TRANSPORTATION

Never before such

Sweeping the Industry

"We have been running one of your Twin Coaches on a heavy downtown residence line for several weeks, and patrons of this line are unanimous in their praise of the riding qualities of the vehicle. In my opinion this type of body, offering as it does a large seating capacity at low weight per seat is the solution for lines whose traffic density and length of trip cannot be handled by a twenty-nine passenger bus, and gives an all weather vehicle of large carrying capacity without the many objectionable features found in the double deck vehicle."

*F. G. Buffee, Vice President
in Charge of Operations
Kansas City Public Service Co.*

"The Twin Coach general type and construction is of such a nature that we will be able to earn more money per bus mile than we can with anything we have heretofore used. On any heavily traveled line, it will be possible to reduce the number of bus miles very materially and at the same time maintain the same amount of gross income."

*H. L. Bollum, President
Twin City Motor Bus Co.
Minneapolis-St. Paul*

Twin Coach



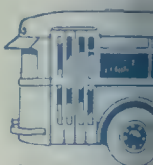
MICHIGAN CITY



DETROIT



AKRON



CHICAGO



KANSAS CITY



HOUSTON



WILKESBARRE

The New Gasoline Street Car

Rider Appeal!

Meeting Every Promise

"The Twin Coach arrangement of driving each rear wheel by a separate motor does away with many of the troubles experienced with the single motor drive through a differential type of rear axle.

"I consider the constant width body a distinct advantage over the typical narrow front vehicle in obviating or reducing accidents, also increasing the seating capacity on a single deck is surely preferable to the double deck type."

*W. B. Mayo, Chairman Board
Detroit Motorbus Co.
Transportation Authority
Land and Air*

"The street car type coach body, built by the Twin Coach Corporation, is at present without doubt the most advanced and practical for single deck operation. It has drawn very favorable comments from the riding public because of the easier riding qualities and excellent capacity for seated and standee passengers. Altogether it is a body that should meet with approval from both patrons and operator."

*Thos. B. Bedford
Operating Manager
Detroit Motorbus Co.*

Twin Coach

SAN DIEGO

NORFOLK

TACOMA

BOSTON

WINNIPEG

PITTSBURG

CLEVELAND

FREE

POKANE

LOS ANGELES

OAKLAND

with Balanced Load on Rubber


You BET

PITTSBURGH MOTOR COACH CO.
 214 LEXINGTON AVE., E. E.
 PITTSBURGH, PENNA.

Attention Mr. T. W. Noonan
 General Manager

PITTSBURGH NOV 1917

RECEIVED CROSS
 ROUTE CAL
 1917



Say Pittsburgh Riders

Do you like the Twin Coach?

Wonderful

Do you like the Twin Coach?

YOU BET

Do you like the Twin Coach?

Yes Indeed

Do you like the Twin Coach?

Yes - Best you have had yet

Do you like the Twin Coach?

Very much

Do you like the Twin Coach?

Great - real Progress

Do you like the Twin Coach?

Hope you get more of them

Do you like the Twin Coach?

I like the Twin Coach better than any bus I have been in -

Have you any suggestions for improvements?

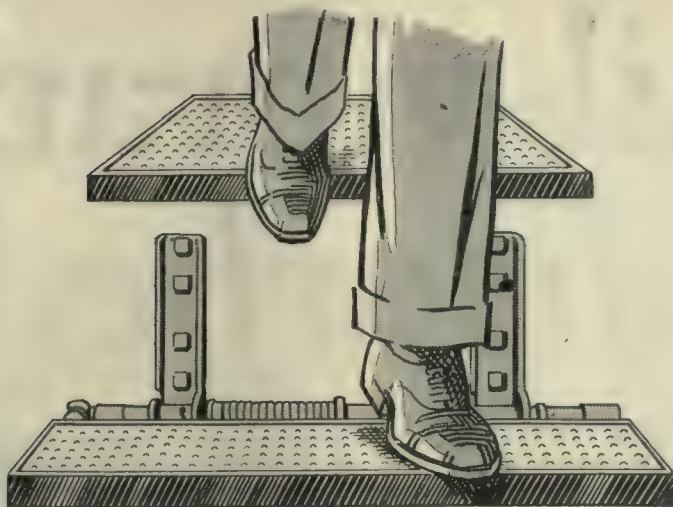
The service rendered with Twin Coach is all that any one could ask for

Have you any suggestions for improvements?

Come of Perfection Put them on Squirrel Hill route

ARE JUST A FEW ANSWERS TO POST CARD QUESTIONNAIRE SENT OUT BY PITTSBURGH MOTOR COACH CO. NAMES AND ADDRESS UPON APPLICATION

Build Your Riding with Twins



TREADLE-IZE★

★The last word in
efficient door
and step control
and in economical
operation of the
circulating load

“CONSTANTLY BETTER”



NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

General Works, Rahway, New Jersey

*MANUFACTURED IN TORONTO, CANADA, BY
Railway & Power Engineering Corp., Ltd.*

*CHICAGO
518 McCormick Building*

*PHILADELPHIA
1010 Colonial Trust Building*



"Rail vibration is absorbed..."

maintenance costs are reduced"

"FOR a long time we studied the problem of how best to overcome the harmful effects of rail vibration," said Mr. H. A. Abell, Engineer of Way & Structures of the New York State Railways. "Much of our street pavement here in Rochester is asphalt, and we have found that, under ordinary traffic conditions, the pavement next to the rail disintegrates rather rapidly.

"In 1924 we made our first test installation of an asphaltic rail filler or cushion, next to the rail. The results of this trial have been most satisfactory. We have found that the asphaltic cushion effectively absorbs vibration and protects the pavement. And we have also noticed a considerable reduction in noise.

"We now have about two and a half miles of double track insulated in this way. This year we shall install nearly two miles more. In fact, this is now standard construction in the case of asphaltic and macadam pavement. We consider it an economy because of the notable reduction in maintenance costs."

* * * * *

And the "asphaltic cushion" described by Mr. Abell is the Carey Elastite System of Track



H. A. Abell, Engineer of Way & Structures of the New York State Railways, at Rochester, N. Y. Mr. Abell has had long experience in dealing with electric traction problems, for the past ten years with the New York State Railways, and prior to that with the Schenectady Railway Co.

Insulation. This remarkable improvement in track construction means not only real savings in maintenance, but also smoother, quieter operation. The Carey Elastite System of Track Insulation is now being adopted by leading traction engineers all over the country. Full information on request.

THE PHILIP CAREY COMPANY, Lockland, CINCINNATI, O.

Carey Elastite
TRADE MARK REGD. U.S. PATENT OFFICE



SYSTEM OF
TRACK INSULATION

Are you hauling a paying volume of good will?

A courage to face facts and an unbiased, penetrating curiosity applied to the street railway industry has revealed one outstanding fact ribbed truth. The companies that have "operating a system" uppermost in their minds are making much less money than are those who are actually engaged in selling COMFORTABLE RIDES.

Basically it is only a difference in viewpoint but the right viewpoint is always a deciding factor when competition enters any field. A line that hauls a heavy volume of good will carries, too, a high total of passengers. "Capacity with Comfort" one of the four cardinal points of Cincinnati BALANCED Lightweight Cars is a subject of paramount importance.

How soon will it be possible for you to study "Capacity with Comfort" with one of our company's representatives?

CINCINNATI CAR COMPANY
Cincinnati, Ohio

CINCINNATI
BALANCED
LIGHTWEIGHT CARS



The cardinal points of today's demand combine in the Four Features of BALANCED Design

"Capacity with comfort."

"Speed with safety."

"Lightweight with strength."

"Beauty with low cost."

Safeguard and Accelerate Traffic

Automatic Signals by providing proper spacing of cars or trains, reduce trip time and enable more cars to be operated with consequent safety.

Interlocking installations at terminals and at grade crossings eliminate unnecessary stops and assure route continuity by means of signal indications.

Highway crossing protective devices of the flashing light, automatic flagman, or audible type, or combination of same, are a dependable insurance which soon pays off the investment.

Power operated remotely controlled switches are being used economically to accelerate Electric Railway traffic.

These Systems are products of the



Union Switch & Signal Co.

SWISSVALE, PA.





Accelerating Traffic by Better Decelerating

The Westinghouse Variable Load Brake helps to accelerate traffic because—

It automatically adjusts braking effect to suit car loading.

Its effectiveness is independent of fluctuation in main reservoir pressure.

It decreases the time of brake application and release.

It permits a higher rate of retardation.

The result — consistently shorter stops.

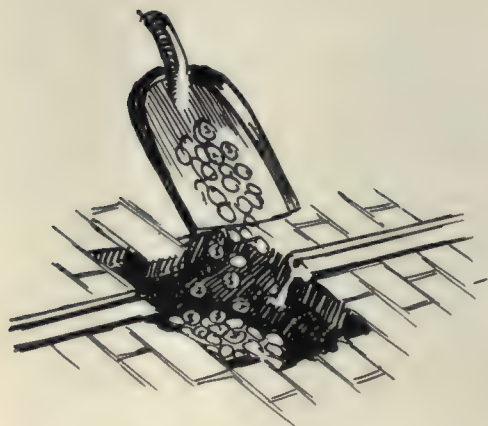
Let our representative amplify and demonstrate the foregoing statements.

Perhaps the Variable Load Brake will help solve *your* traffic problem.

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES



Every time you open it
up to patch that joint
again—

it's just like shoveling more dollars
into a hole in the ground. They're
gone and they haven't done any per-
manent good.

With Thermit, the story has a hap-
pier ending! A Thermit Weld gets
rid of the joint, once and for all. It
makes a smooth continuous piece of
track without a break—a piece of
track which will develop the full life
of the rail itself, without further
maintenance cost.

1
or
1000 THERMIT WELDS



It's a proved proposition, economi-
cal for one joint or for many, for the
ordinary joint repair job or for the
mile of track to be rebuilt. Do the
repair jobs with Thermit and watch
the maintenance costs go down.



METAL & THERMIT CORPORATION

120 BROADWAY, NEW YORK, N.Y.

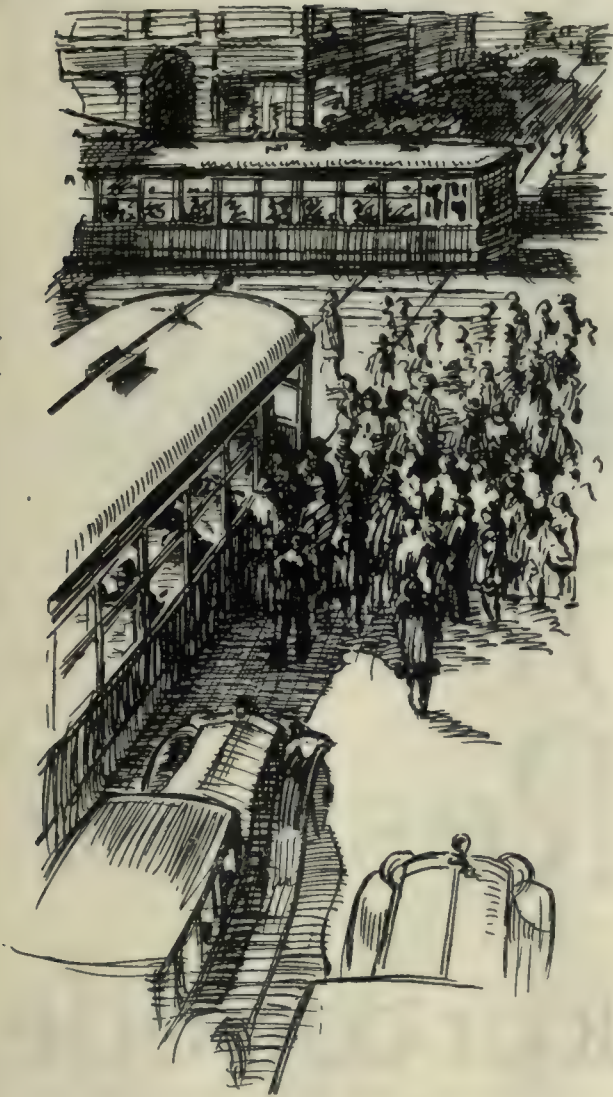
PITTSBURGH

CHICAGO

BOSTON

SOUTH SAN FRANCISCO

TORONTO



10 to 40
stops per mile—

How about *your* wheels?

Cars in city service stop that often, and stop quickly. Wheels and Axles must give unusual service to prove economical on such lines.

"Standard" Wheels, Springs and Axles are chosen for the nation's leading railway lines. They answer service demands.

*Rolled
Steel
Wheels*

*Armature
Shafts*

*Axles
and
Springs*



"FOR EVERY
TYPE OF CAR



IN EVERY
TYPE OF
SERVICE"

**STANDARD STEEL
WORKS COMPANY**

PHILADELPHIA, PA.

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HOUSTON, TEXAS
PORTLAND, ORE.
RICHMOND, VA.
SAN FRANCISCO

ST. PAUL, MINN.
PITTSBURGH, PA.
MEXICO CITY

WORKS: BURNHAM, PA.



This Resistor does not break or corrode

Exposure to the elements does not affect the G-E Type EW resistor, because the units are made of a special non-corrodible alloy; nor will vibration break it, because the alloy is flexible and has a high tensile strength.



You can materially decrease your maintenance and improve your service by taking advantage of the improvements which General Electric is constantly making in railway equipment.

That is why it is so well suited to railway service, where vibration and exposure to the elements tend to shorten the life of the grid-type resistor.

In addition, the EW resistor weighs only half as much as the grid-type resistor of the same capacity, and it has a practically constant resistance regardless of the temperature.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company, Inc.
CHARLES GORDON, Editor

Volume 71

New York, Saturday, March 3, 1928

Number 9

Financial Structure of Buffalo Company Strengthened

STOCKHOLDERS of the International Railway, Buffalo, have approved a plan for strengthening the financial structure of the company, thereby improving its credit and increasing its ability to render steadily improving service. The plan provides for immediate amortization of intangible capital which the Public Service Commission has suggested be amortized over a period of years, for the writing off of strike suspense, for the issuing of no par value common stock in exchange for present common stock of \$100 par value and for the issuing of \$2,000,000 of preferred stock. The present plan is to make the preferred issue available first to present stockholders in proportion to their holdings.

This action might be dismissed with no other comment than that it is merely another move in the upbuilding of the system, but it really is much more important than that. No end of hard work has been done by the management in Buffalo, and it would appear now that the company there is again coming into its own. The city is saturated with autos even to a greater extent than other cities of similar size, and in addition to that there have been elements of political antagonism to contend with that were largely heritages from past régimes. Some of that ground has been gone over before in *ELECTRIC RAILWAY JOURNAL*.

The conditions at Buffalo which make desirable the financial changes now proposed had their beginning in 1912, when the railway mortgaged its property. At that time the Public Service Commission directed that the company set up on its books an item of \$12,651,500 as intangible capital to be amortized over a period of years. Of this amount approximately \$4,000,000 has been written off. The company is now carrying on the asset side of its balance sheet an item of roughly \$6,000,000 strike suspense. It was intended that this should be written off over a period of years, but the present plan will permit the amount to be written off immediately. The substitution of no par value stock for \$100 par value stock and the resulting changes in the company's balance sheet have been approved by the Public Service Commission. Sanction for the proposed issue of preferred stock will now be sought from the commission. Proceeds from the sale of this preferred stock will be used for the substitution of permanent financing for temporary financing of necessary capital expenditures and for future similar requirements.

For the benefit of the stockholders of the company and for the information of the public the company explains that changing the common stock from \$100 par value to no par value has no effect upon the value of the stock, or upon its earning power. There will be exactly the same number of shares, and each certificate will represent the same share of ownership. It

is an interesting move, one that the entire industry may well ponder, particularly since the change would seem to presage early future financing with preferred stock, in which it is reasonable to expect both the employees of the company and the public as well will be permitted to participate.

Lessons Taught by the Pittsburgh Traffic Report

DISCLOSURE in the recent traffic study in Pittsburgh that the number of vehicles entering the business district each day has more than doubled during the past ten years, shows a situation that could probably be paralleled in many other large cities of the country. A second fact found in this same survey, that in spite of this influx of buses, taxicabs and private automobiles, the street cars still carry the vast majority of the city workers to their places of business, will also find a counterpart in other metropolitan areas. Hence, if there is a solution of the Pittsburgh problem, it ought to help elsewhere.

The Pittsburgh City Transit Commission thinks that the answer is to put the trolley cars within the business district in a subway which later could be used for high speed trains when rapid transit extensions can be built in the outlying portions of the city. This will relieve the congestion in the downtown area by permitting all of the street surface to be used by free-moving vehicles only, according to the commission. The higher speed of the cars possible underground will attract more passengers to them and thus help still further to relieve the surface congestion.

In cities large and wealthy enough to afford underground highways, the plan is an excellent one, provided the cost of the improvement is not assessed entirely or largely on the car riders. They are only one group among many to whom the increase in street space thus made possible is of benefit. Nor should the transportation company be made to bear the cost. It is quite as apt to suffer as to benefit by the change. Its cars will make better time, it is true, and the company will gain in the number of passengers which it will carry. But these passengers will be in the long-distance class, and the pick-up business of short-haul passengers will probably be much less. Experience has shown that the short-distance rider does not like to climb up and down steps. It must also not be forgotten that removal of the tracks from the surface will decrease the means for riding within the business district. Those who are accustomed to patronizing the street cars for this purpose will have to adopt a more expensive way for getting about or else walk.

Of course, there are many cities in the country with serious street congestion where such a solution is impracticable. A subway is a luxury which only a few communities can afford. The smaller cities must continue to operate cars and automobiles on the same street level.

There, the aim should be to secure the maximum useful width of street in the congested sections by reducing or eliminating parking, then to co-ordinate the traffic flow by shortening the waiting time of vehicles at crossings and increase the speed of movement, particularly of the street cars. Until the average car speed equals that of the free-moving motor vehicle on the same street, street railway operation will be under a handicap.

Columbia Reaps the Consequences

COLUMBIA, S. C., is the scene of a transportation travesty with a record number of performances which is becoming a bore to spectators and something of a blight on the accomplishments of that section of the South. Reports emanating from that territory state that the citizens are more and more aroused over the lack of a responsible transport service and are going to force the issue in the April election of City Council members. But making the transportation tangle the main issue in the election will not undo the bungling and befogging of the issues involved for which honors are evenly divided among the people and the authorities. Constructive thinking, deft handling, conciliatory methods and active authority are the new characters that must enter quickly to produce a happy ending in Columbia.

Glossing over the facts will not mitigate the conditions aggravated since Jan. 1 of this year when the citizens were left to the mercy of unregulated jitneys for their means of transportation. Almost a year has transpired since the Columbia Railway, Gas & Electric Company, unable to justify necessary expenditures to physical property, abandoned service on its railway system of 32 miles. A glance at the traffic records since 1923 is convincing proof of the inability of the company to continue to supply this service. In that year 3,270,321 passengers were carried. Since then there has been a consistent decline—1924, 2,948,928; 1925, 2,290,734 and in 1926, 1,613,891. The loss of patronage forced the company to abandon service on March 11, leaving approximately 50,000 people to be transported by the systems which had contributed to its downfall, namely, the Carolina Transit Company and the 10-cent haphazard jitneys.

Events since that time have been covered in the news section of this paper. Suffice it to say now that the past fourteen months have been prolific of multifarious moves toward restoration of railway service, counter moves for bus operation, bills to eliminate the jitney, threats to intimidate the railway, an impasse, commission opinions, another impasse, federal stay, public demands and so on ad absurdum.

Whatever conclusions might be drawn on the rights of one utility agency against another, it would appear that co-operation and conciliation could certainly have done no worse than condemnation and conflict, and considered in the light of experience in other cities, they might have helped toward a solution. Three separate and distinct agencies serving approximately 50,000 people were competing for a failure, and that failure appears to have fallen on all three. Now if the people want the railway service restored—and many indications point that way—then that system should be so supported that it will be a paying enterprise responsible to a thinking and just authority and reliable to a co-operative and fair-dealing public. If public opinion prefers another system of transport, then such a system should be installed and

should meet the same conditions as would prevail with a railway.

These unsavory details in the story of a public service represent the ultimate result of destructive public policy founded on much opinion, little knowledge and the lack of a spirit of fair play. One can hardly refrain from expressing the opinion that Columbia is in a measure reaping as it sowed. The transportation comedy there has its tragic aspects—tragic indeed to those who invested their money in good faith. It is to be hoped that the story may be broadcast to other cities that are inclined to think that they can manhandle and starve facilities and have them continue to perform. As for Columbia, it is high time for it to draw the curtain on the scene and put on a new act with sufficient promise to induce forgetfulness of past performances.

Accountants Should Not Be Historians Only

GROWING interest in accounting is shown by the work of the Central Electric Railway Accountants' Association at its recent meeting. Problems that deal with the progress of the electric roads in the territory were discussed at length and plans were made for furthering the interchange of freight, handling of records and other details that are essential if these railways are to increase their business. Along the same line, President Healy in his inaugural address showed how the accountants have been an influence for many years in the affairs of their companies.

A progressive viewpoint such as this is essential if the accountant is to be the power for good that he can be. He is in a position where he is able to wield an immense influence over his company. While the keeping of records of what has happened already is fairly simple, it is the interpretation of what is likely to happen, as disclosed by the figures, which is of far greater value. This is a task of no mean importance. Budgeting is being resorted to more and more, both with regard to expenditures and on some properties with regard to revenues. Naturally if a program for expenditures is to be figured out for a year or any longer period it is essential that some attention be paid to the collection of revenue that will make the program possible. In both of these phases the accountant must exercise the best of judgment if the estimates are to be of maximum value.

Another class of accounting, which perhaps has not been given equal attention, is the determination of costs for different types of construction or equipment. For instance, carefully kept records over an extended period almost invariably will indicate which type of car, of motor or of track is the most economical. Operating costs should indicate whether it is an economy to continue the use of an obsolete car, an old substation or an antiquated stretch of track as compared with the cost of new. Similar comparisons can be made regarding any detail of the operation. Occasionally the individual departments have made the attempt to keep such figures, often without result. The accounting department, however, is the place where information of this sort can be compiled most accurately and most cheaply. Naturally, conferences with the other departments involved are necessary if intelligent statistics are to be collected. It is the exercise of such intelligence that makes the accountant a real power in his company rather than a mere bookkeeper. Meetings of accountants that look forward to this end are well worth while.

The Turk Turns on the Onion Eater

CIVILIZATION as the West knows it has had unexpected results in its application to the Turks. The fez is going or has gone, the harem as an institution has passed, trousers have come in for use by the ruler's wife and his inamorata or inamoratas and the veiled woman meanders only through the pages of history and the stories of oriental romance. In Turkey modernism has gone mad. Witness the reported order issued recently to street car conductors of Constantinople to eject from the trams passengers who have been eating onions. In other words, conductors there must really know their onions. So it will be the rule that the men who man cars there must choose between the onion eater and the lotus eater. There must be nothing the matter with their olfactory organs lest an inspector passing through the car detect an odor where they have sensed none.

Here is a parallel out of the East to the beautiful girl in the newspaper ad who grows reticent because the man with millions or erudition that she should adore is a victim of halitosis. In that respect she has nothing on the Constantinople conductor who should now apparently recommend the use of some deodorant. Since onions are a national dish of the Turks the idea of legislating against the weeping weed might have terrible effects should others adopt a similar policy. Suppose Dublin conductors had to put passengers off who were suspected of eating Irish stew, Viennese trainmen to eject those suspected of eating Hungarian goulash, Berliners those of eating Limburger cheese, Glasgows those of eating Scotch scones, and New Yorkers those of eating gefilltefish or known to have gulped garlic.

Here is an idea for the segregation of passengers along gastronomic lines. Enforced use of the open air elevated lines in New York by all of its garlic eaters might make it possible for the rest to ride in comfort in the subway. There is no end to the possibilities that are opened up. It was the late Mr. Whitridge, then receiver of the Third Avenue Railway in New York, who said that he didn't improve the rolling stock of some of his lines because there was no sense of putting people who apparently never bathed into surroundings with which they were utterly unfamiliar. Of course he stretched the thing a little, as was his wont as a practical joker. He did what little he could about it. The Turk apparently is more militant. The gastronomic special will never be realized, but if advices so far at hand are to receive credence it will probably not be because the Turk has not tried. In any event it will be interesting to have further information on the effect of the order.

Interborough Labor Controversy Has Several Angles

HASTY conclusions should not be drawn from the decision of Justice Wasservogel in the Interborough Rapid Transit labor case. Certainly, the decision is not the sweeping victory indicated in the statement of the organizer of the Amalgamated Association to the effect that "the absolute justice of our cause has now been established." As the *Wall Street Journal* has forcefully pointed out, nothing in the decision as reported in the press touches upon the asserted right of the company to lay down such conditions of employment as it pleases. The court simply refuses the Interborough an injunction to restrain the national union from soliciting Inter-

borough employees to join its ranks. It affirms the right of the company to make as a continuous condition of employment for each individual in its employ that he will not join any particular union. Reduced to its essential the present decision is that the agreement which the railway requires of all of its employees to sign is on its face inequitable and therefore not the kind of a contract which a court of equity will protect. The court ruled that whatever the status of the contract at law, there was no compensating consideration where an employee abandons all right to leave the service of his employer, whereas the company reserves practically entire freedom to discharge him.

In the various comments on the case the instance of the United Mine Workers is mentioned and also that of the more recent decision of a federal court in Texas under which the Southern Pacific Company has been required to recognize a national union which claimed to represent the road's clerks, instead of the union with no affiliations outside the company. As between the Interborough case and that of the mine workers, there would seem to be an apparent conflict, since in the mine case the Supreme Court upheld an injunction which prevented the United Mine Workers from soliciting membership among the non-union miners in West Virginia. Whether the conflict here is real or only apparent depends, of course, on the nature of the two contracts.

The Southern Pacific litigation, just decided, involves both questions of law and of policy far reaching in their importance. The questions of law arise out of the construction of the so-called railway labor act passed in 1926. The questions of policy may be briefly stated to be whether the local employees on a railway shall be free to conduct their negotiations with the management in their own way, or whether they shall be dominated and controlled by an outside organization. The position of the company was that in dealing with the local association, which its clerical employees had formed on these lines, the company felt that it was representative not only of a majority of the clerical employees, but that it was a local organization that would have more vitally at heart the success of the railway enterprise in which both management and men were engaged, and the welfare of its members as a whole, than the clerk's union dominated by central powers from abroad. The company has determined to carry the case up on appeal.

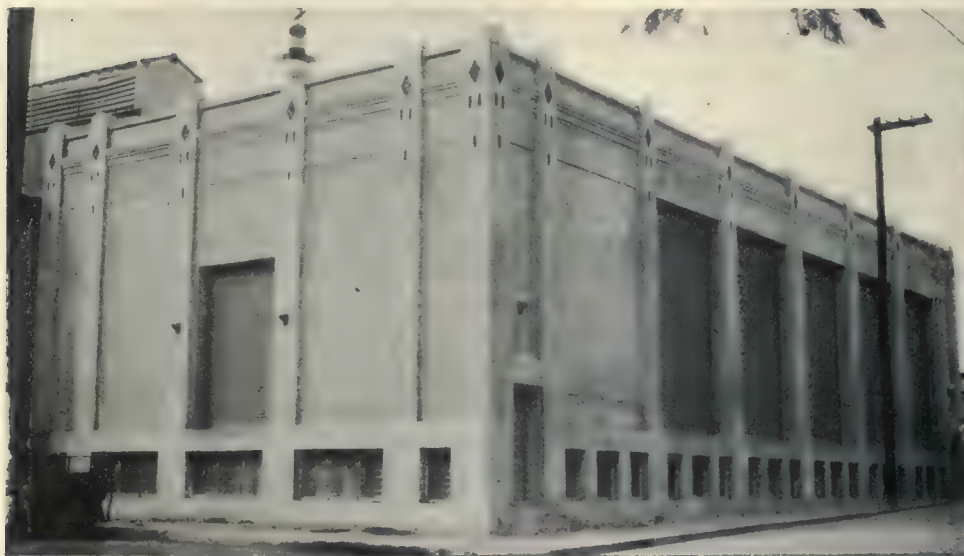
So much for some of the technicalities. Within the limitations imposed by the 5-cent fare the Interborough has shown itself ready to deal liberally with its employees. It has even indicated that if the proposal for an increase in fare is successful, the men will participate to a greater extent than at present in the earnings of the company. But even at the present rates of pay, there is no indication that the roster of the company is not always full. A condition of this kind certainly indicates that the scale of pay must be fairly comparable with that which obtains in other lines of work similar to the railway service in the conditions that are exacted from those engaged in it. That, of course, is just one way of looking at the matter. If it would seem from the court's decision that the company has perhaps been over-zealous in the lengths to which it has gone in its efforts to protect all its employees, the reason for its concern was very well expressed by the Amalgamated's own organizer when he said following the court's ruling that "we intend to hammer our way through to victory whether or not stubborn Bourbons oppose our progress." This statement appears to leave little doubt as to the identity of the aggressor.

Two Automatic Substations Installed in Cuba

Operation of the new stations has increased the trolley voltage and given relief to the other substations of the Havana Electric Railway, Light & Power Company

By G. S. Whitlow

Switchboard Engineering Department, General Electric Company



Principe, Cuba, automatic substation, built to carry railway, power and lighting loads.
A similar station has been built at Toyo

PERHAPS the most interesting recent installations on the island of Cuba are two automatic substations recently put into operation for the Havana Electric Railway, Light & Power Company, one in Principe, the other in Toyo. They are arranged for automatically supplying railway, power, and lighting loads. Power is brought in through 13,200-volt, 60-cycle, three-phase underground feeders and is stepped down to 4,000 volts for a.c. distribution, or converted into 600 volts direct current for the street railway system.

Prior to the new installation, the distribution system of this company included eight outlying substations, four for railway, power and lighting loads, two for railway loads only, and two for lighting loads only. All of the a.c. distribution, except for three 6,000-volt feeders from the power plant, is at 2,300 volts, three-phase. Voltage in each feeder is regulated by a bank of two induction regulators connected in open delta. The 600-volt railway system is ungrounded with two overhead trolleys.

The exterior of the Principe substation is shown in one of the views. The other, located in Toyo, is identical in construction. Both are of reinforced concrete, having a single story with basement, and built to withstand the cyclones experienced in this climate. Neither building is soundproof but with all the doors closed the machine noises are barely perceptible outside. The transformers are installed in fireproof compart-

ments with doors opening on the outside. These may be seen closed in the view of the station and opened in another illustration. On the main floor of the Principe substation, shown in one of the engravings, are the truck equipments, d.c. switchboards, synchronous converter, and power transformers. Space and conduit runs have been provided for a second converter and future d.c. feeders. The voltage regulators, current limiting reactors, station service transformers and storage batteries are located in the basement. Provision has been made for two additional 4,000-volt feeders, as may be seen in the illustration of the basement.

Ventilation of the machine room is by louvers below the main floor level in three of the side walls. The air passes out through rotary-type roof ventilators. The transformer compartments have forced ventilation, the cool air entering through louvers below the grille-work floor on which the transformers are set, while the warm air is forced out by individual motor-operated fans in the roof. When an oil circuit breaker closes, energizing a transformer, the ventilating fan motor for that transformer is automatically started.

Each substation has a 13,200-volt underground tie to a substation that was formerly fed solely by overhead feeders from the power plant. This makes it possible to feed all substations in the system by underground feeders. This is desirable because of the severe windstorms which

sometimes damage the overhead lines. All incoming and outgoing a.c. feeders are three-conductor, paper-insulated, compound-filled, lead-covered underground cables. The power connections inside the substation are single-conductor, rubber-insulated, flame-proof cables.

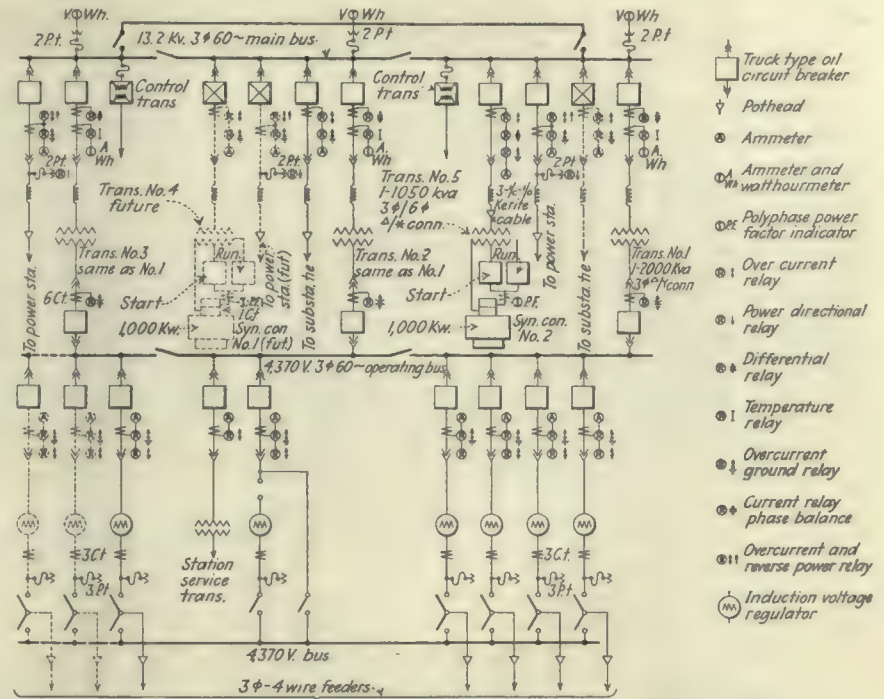
The Principe substation equipment, listed in an accompanying table, includes three transformers, rated 2,000 kva., 13,200/4,370/2,530 volts, three-phase, three-wire and 60 cycles. The neutral on the low side of each one is grounded. The synchronous converter is rated 575 volts d.c., 1,000 kw., six-phase, six-wire and 60 cycles. It is shunt-wound and started from the 50 per cent transformer taps. Eighteen induction voltage regulators, a station service transformer bank and feeder, a 1,050-kva. transformer with 50 per cent taps in secondary and automatic selector supervisory equipment are also installed in the substation. The Toyo substation is identically equipped except there are only two 2,000-kva. transformers.

The incoming line circuit breakers will close automatically when three-phase voltage of the correct phase rotation is impressed on them. If trouble occurs on either line, the breaker in that line will open by the action of the power-directional and over-current relays. When the breakers in the power plant are closed again manually, after the trouble has been cleared, the substation breakers will reclose automatically.

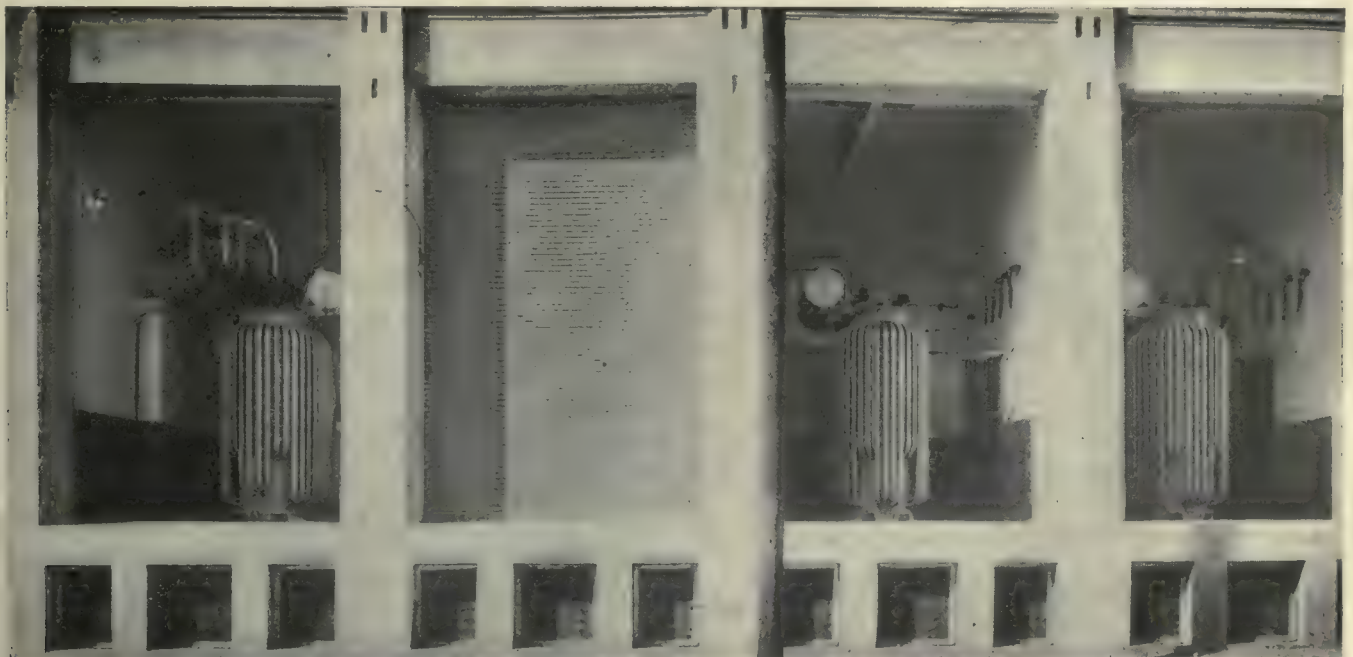
One of the power transformers is normally connected to the load. Should the 4,000-volt a.c. load increase to slightly more than full load in the first transformer, and be sustained for a predetermined time, the second transformer automatically will be brought into service. Similarly, the third transformer is connected when the load

exceeds the predetermined value for two units. Should any transformer fail the next transformer in sequence takes its place. When the trouble on the faulty transformer is cleared it automatically resumes its original place in the sequence. Differential relays protect against internal transformer faults, and thermal relays provide protection against continued overload. By a manually-operated transfer switch transformers No. 1 and No. 3 can be interchanged in the leading and trailing sequence positions to equalize the service.

The substation tie feeder has a transfer switch for local or remote control. In the local position, the tie breaker can only be operated by a control switch mounted on the breaker truck. In the remote position it is con-



Wiring diagram showing relation of the many relays and meters. The broken lines indicate future installations



Transformers are installed in fireproof compartments with forced ventilation, opening only to the outside

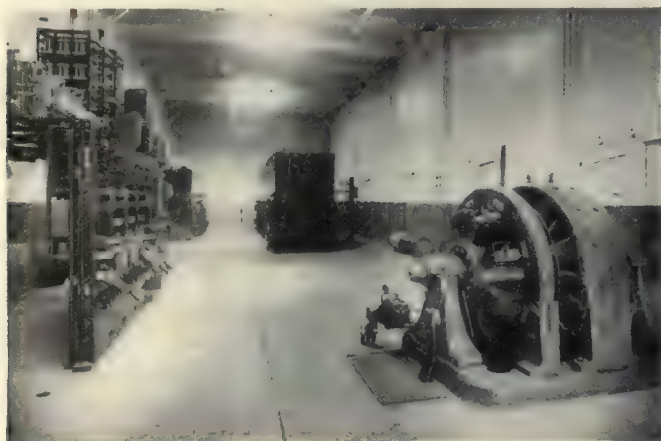
trolled entirely by the supervisory equipment from the dispatcher's office. This feeder is provided with overload protection.

The 4,000-volt a.c. feeders are protected with inverse time delay overload relays, arranged for three reclosures at 30-second intervals. If the overload persists after the third reclosure, the breaker will be locked out and must be reset manually. If the breaker is tripped manually by the control switch, the automatic reclosures will not take place until the breaker is again closed by the control switch.

The synchronous converter equipment is arranged so that with low trolley voltage, persisting for a predetermined time, the converter will be started and connected to the load. This equipment is protected against low a.c. line voltage, single or reverse phase conditions, internal machine faults, a.c. overload, overheated winding, overheated bearings, overspeed, reverse power and flashover. The equipment is also arranged with load limiting resistors in order that the machine will not be connected directly to a heavy load so that it would cause a disturbance to the system, and so as to limit the amount of overload carried by shifting part of this load to

The automatic d.c. reclosing feeders will trip at a predetermined current. If the overload disappears they will reclose after a definite time, on either stub or multiple feed from either direction.

The automatic supervisory equipment used in these substations is of the selector type. It controls and indicates the position of the substation tie and indicates the position of all other breakers and the d.c. line contactor. In the dispatcher's office is the key and lamp cabinet in which are located the keys for sending out signals, and the red and green indicating lamps. Any change in the position of a substation breaker closes a circuit through an auxiliary switch, starts a motor-sending key and releases the corresponding code wheel which sends a series of impulses out over the line wires to the dispatcher's office. A selector relay having the same code setting is caused to move to the operating point and close an auxiliary relay which changes the indicating lamp. A bell also rings to notify the operator. A similar sequence of operations takes place when the dispatcher, desiring to operate a substation breaker, turns the proper selector key. The dispatcher also is provided with a means of checking the position of any supervised devices.



Interior view of the Principe substation showing the positive d.c. board, equipment for the 4,000 and 13,200-volt trucks and the 1,000-kw. converter



Voltage regulators, reactors and service transformers are located in the basement. Note the provisions for installing two additional feeders

adjacent substations. If this limited overload is carried long enough to overheat the resistors, the machine is shut down until the resistors have cooled. Normal trolley voltage and light load will shut down the converter after a predetermined time.

EQUIPMENT OF THE PRINCIPE AUTOMATIC SUBSTATION OF THE HAVANA ELECTRIC RAILWAY, LIGHT & POWER COMPANY

All apparatus is designed for three-phase 60-cycle circuits except as indicated.

- Two a.c. incoming lines, each 13,200 volts, 5,000 kva. maximum.
- One a.c. substation tie line, 13,200 volts, 500 kva. maximum.
- Three transformers, each 13,200/4,370/2,520 volt, 2,000 kva.
- Six a.c. feeders (one transfer), each 4,370 volt, 300 amp. maximum, neutral grounded.
- Eighteen induction voltage regulators, 250 amp., 2,300 volt, single-phase, with three connected in Y and neutral grounded.
- One station service transformer bank and feeder, 4,370 volt, 50 kva.
- One transformer, 13,200/430 volts, 1,050 nominal kva., three-phase, three-wire/six-phase, six-wire, step down with 50 per cent taps in secondary.
- One synchronous converter, 575 volt d.c. 1,000 nominal kw., six phase, six wire, shunt-wound and started from the 50 per cent transformer taps.
- Four d.c. positive feeders (one transfer), 600 volts, 1,500 amp.
- Three d.c. negative feeders, 600 volts, 1,500 amp.
- One storage battery, 60 cell, 120 volts.
- One automatic selector supervisory equipment for controlling one oil circuit breaker and indicating the positions of ten oil circuit breakers and one d.c. line contactor.

The installation of these substations resulted in an increase of trolley voltage in heavily loaded areas, lengthening the life of the car motors and permitting better car schedules; relief of the distribution load on other substations by the installation of new 4,000-volt feeders; and the removal of load from one distribution substation, which will be abandoned in the near future.

Car Efficiency Increased

CHICAGO SURFACE LINES cars made a new record last year for mileage operated without mechanical failure. The average car was run 24,168 miles without a failure of any of its equipment of sufficient importance to require its being taken off the street and out of service. This is an increase of 10,961 miles in operation per car as compared with the previous year and indicates an increase in efficiency of 83 per cent. The better record is made possible by careful maintenance.

During the year 1,591 of the 3,639 cars owned by the company were sent through the shops for complete overhauling and repainting. On this schedule, practically every car will be completely overhauled, repainted and put in first-class condition once in two years.



New terminal buildings at Burlington, East Troy and Watertown provide facilities for interchanging car and bus passengers under cover. This view of the Burlington station shows express platform at rear of building

Service First

Is Milwaukee's Transportation Slogan

PART II

By Charles Gordon

THE construction of rapid transit facilities for Milwaukee and the improvement of interurban service has been paralleled by service improvements on street railway lines within the city. One of the first departures in the development of Milwaukee rolling stock was made in 1919 when the first sample three-truck train was designed and built. In 1920, the first sample one-man, two-man car of the Milwaukee 800 type was built in the company's shop and was tried in service.

Back of the three-truck train was the idea of providing a more efficient means of handling rush-hour traffic, through the utilization of the existing equipment on the property. Adoption of this policy led to the double economy of cutting the cost of handling rush-hour business, while at the same time relegating the oldest equipment on the property to operation only a comparatively few hours a day during the rush periods. This made it possible to use money spent for new equipment, for the purchase of comparatively light-weight and efficient cars to be used on base schedules throughout the day. Introduction of one-man operation made it possible to give improved service through operation of cars at maximum possible frequency.

The standard of service in Milwaukee is unusually high and is enforced by the Railroad Commission under the following regulations:

The Milwaukee Electric Railway & Light Company's program of anticipating the transportation needs of its community has resulted in major improvements of city service and the development of a comprehensive co-ordinated bus system

On two-man lines all peaks of the rush period shall receive service on the basis of 67 seats for each 100 passengers.

All transition intervals of the rush period shall receive service on the basis of 90 seats for each 100 passengers.

Peaks of the non-rush period shall receive service on the basis of 90 seats for each 100 passengers, except that at no time shall the application of the standard require additional service for less than two round trips

unless the ratio of seats to passengers is less than 67 to 100.

All normal intervals of the non-rush period where the traffic is not greater than 100 passengers per half hour shall receive service on the basis of 133 seats for each 100 passengers, provided that between the hours of 6 a.m. and 11 p.m. not less than a ten-minute service shall be operated except on certain divided outer ends of lines which shall receive not less than a twelve-minute service, and provided that on all lines between the hours of 11 p.m. and 1 a.m. not less than a fifteen-minute service shall be operated, and provided further that hourly service shall be operated on the principal lines from 1 a.m. to 6 a.m.

Normal intervals of the non-rush period where the traffic is greater than 450 passengers per half hour shall receive service on the basis of 110 seats for each 100 passengers.

All normal intervals of the non-rush period where the traffic is greater than 100 and less than 450 passengers per half hour shall receive service upon the basis of a ratio of seats to passengers that gradually diminishes from 133 to 100, to 110 to 100.

At no time shall the peak (rush or non-rush) or transition service be less than the requirement for normal traffic in any half hour of the one hour preceding or following the peak or transition. At no time shall the transition service be greater than the rush-period peak requirement immediately preceding or following.

For one-man cars service has been furnished during the peaks of the rush period on an 80 seats per 100 pas-



The most recent type of one-man car in Milwaukee includes many features for passenger comfort and safety. The lower view shows the interior of recent one-man city cars with center lighting, wide aisles and comfortable seats

sengers standard. No non-rush standards have been set except that it has been the practice of the company to increase the non-rush service by at least 20 per cent.

Additions and improvements to the company's equipment followed rapidly after the preliminary experimental work was done. In 1919, 60 Birney-type, one-man safety cars were purchased for service in Racine. From 1919 to 1925, a total of 165 three-truck trains were built from former double-truck bodies, and these were rapidly introduced on various lines in the city as soon as they could be put through the shops.

In April, 1920, a lot of 100 cars of the original 800 type, designed for one-man, two-man operation, were ordered from the St. Louis Car Company. These cars were all equipped with full safety car devices. In 1921, the 35th Street line was started with one-man operation, using ten of the new group of "800 type" cars. From this time until 1924, one-man operation was gradually introduced on several of Milwaukee's outlying lines. In 1923, another lot of 25 cars of similar type were purchased, and ten cars of the same general design, but shorter in over-all length, were added to the service in Racine.

By 1924 the further extension of one-man operation on lines operating through the business district of the city became an obvious necessity to make possible desirable service improvements within the limited income available from railway operations. An investigation was started

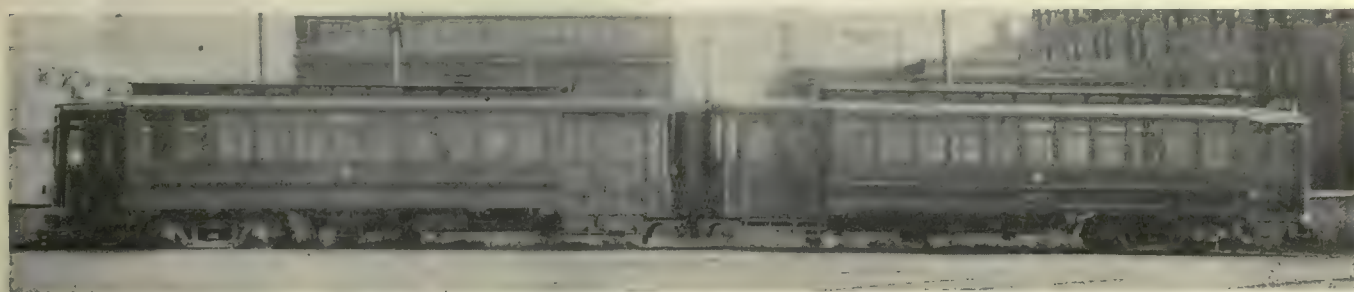
in co-operation with the Wisconsin Railroad Commission. This led to a decision to give a serious trial to the use of one-man cars on a line operating through the congested district. In undertaking this step, automatic exit doors were introduced at the rear ends of the cars, and the operator's duties were further simplified through the introduction of electric heat and other labor saving and safety devices on the cars.

In January, 1925, the Clybourn line was started with one-man operation, these being the first one-man cars in regular service through the congested business district. Today a total of 217 cars, including ten new cars just being delivered, are arranged for one-man operation and are run on the 35th Street line, 27th Street, Center, North, Clybourn, Walnut, Oakland-Delaware, Wells-Downer, and State Street routes. Five of these lines operate through the congested business district. During the rush hours, the one-man car service is augmented with three-truck trains. The net result of the greater operating efficiency which is thus made possible by one-man operation is that the public has in every instance profited through a 20 per cent increase in service, while at the same time, operators of the cars receive increased pay.

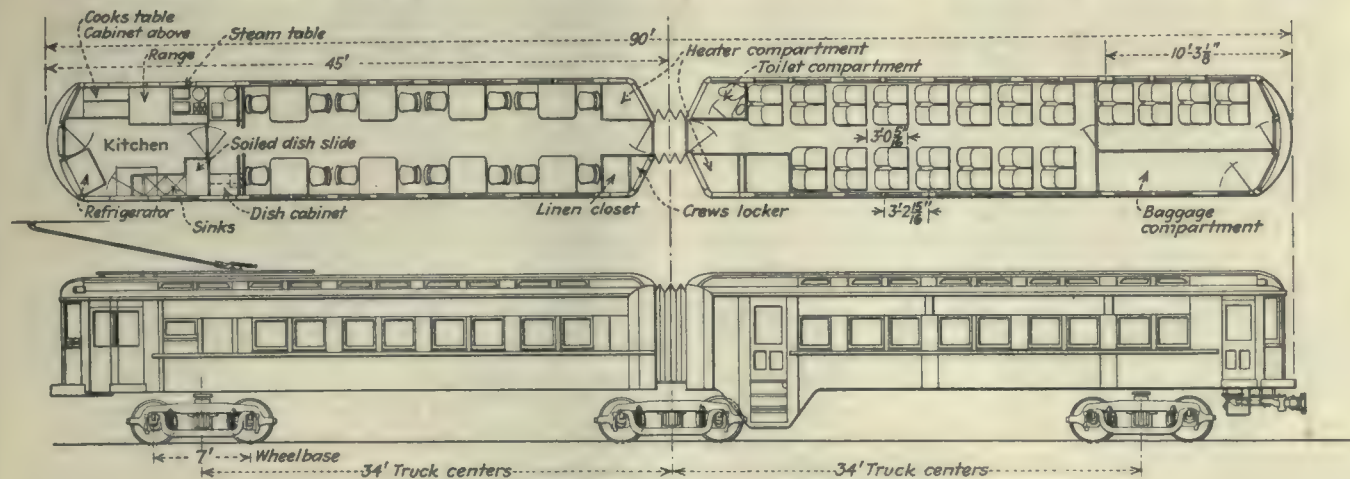
Following the demonstration of the service improve-



Brake piping and controller have been inclosed on recent city cars for Milwaukee



These three-truck trains in Milwaukee have proved very efficient for handling rush-hour loads economically



Plan and elevation of new articulated dining car unit for Watertown line

ments which are made possible through one-man operation, 40 more of the "800 type" cars were purchased in 1926, which included many features for improved passenger comfort, safety and operating efficiency. These cars are equipped with fabric upholstered seats, cabinets enclosing the controllers, electric heat, center lighting, and treadle exit doors with safety control. In 1927 ten more cars of this type were purchased and have just been delivered within the past few weeks. These cars have genuine leather-covered seats.

Additional one-man equipment was provided in 1926 by rebuilding twenty cars of the 500 type. In 1927 an additional lot of twenty of these cars were put through the shop and equipped with all the convenience and safety features for one-man operation that are included in new equipment purchased by the property. At the present time there are available for service in Milwaukee

737 city cars. In addition there are 54 city cars in Racine and thirteen city cars on the Milwaukee Northern property. Including the equipment of the Milwaukee Northern, there are in addition to this city equipment, a total of 109 interurban passenger cars available.

The Milwaukee Electric Railway & Light Company was one of the pioneers among electric railway properties in the operation of buses. It extended this service rapidly as the use of buses to supplement rail lines became better understood, and today furnishes both in Milwaukee and in the entire southeastern portion of the state a completely co-ordinated service which has been carefully built up step by step to complete the company's transportation service to the city of Milwaukee and to the surrounding communities in the state.

In the fall of 1921 there were a total of thirteen buses in service. Nine of these were used for feeders to city lines and for transfer connections. Four were put on roads adjacent to interurban lines of the company to meet the incroachments of independent competitors. Following this early experience with buses operated directly as auxiliaries of the rail service in the city of Milwaukee, an independent preferred type of service at a 10-cent fare was started in the city. During this period, also, interurban bus operation was extended rapidly to meet and anticipate the demand for bus transportation in the entire area of the company's operations.

Up to 1922, buses in use consisted of comparatively crude equipment with home-built bodies and in some cases light truck chassis with makeshift passenger bodies. During the year 1922



Type of car recently rebuilt for one-man operation with full safety equipment

MILWAUKEE BUS OPERATION TYPES OF EQUIPMENT IN SERVICE

Make	Model	Type	Quantity	Seating Capacity	Weight Empty	Size and Type of Tires			Operation	Average Miles per Day per Bus
						Front	Rear			
White.....	1545	Sedan	1	11	7,210	36x6	HP. 36x6	HP. Single	Intercity	30
White.....	1545	Sedan	7	14	8,190	36x6	HP. 36x6	HP. Single	Intercity	131
White.....	15	Street Car	7	12	5,650	36x6	HP. 36x6	HP. Single	Intercity 1, City 6	58
White.....	50	Street Car	6	18	8,300	36x6	HP. ^a 36x6	HP. Dual ^e	Intercity 4, City 2	99
White.....	50	Sedan	2	16	9,820	36x6	HP. 36x6	HP. Dual	Intercity	159
White.....	50-A	Sedan	5	20	11,200	36x6	HP. 36x6	HP. Dual	Intercity	154
Nash.....	2018	Street Car	1	17	7,400	36x6	HP. 40x8	HP. Single	City	54
Nash.....	3018	Street Car	3	17	7,400	34x5	Cush. 34x5	Cush. Dual	City	32
Fifth Avenue Coach.....	J	Street Car	16	20	8,900	36x6	HP. 36x6	HP. Dual	City	130
Fifth Avenue Coach.....	L	Double Deck	10	42	11,270	36x6	HP. 34x6	Cush. Dual	City	57
Fageol.....	4 Cyl.	Sedan*	5	19	8,920	36x6	HP. ^b 36x6	HP. Dual ^f	Intercity	90
Fageol.....	6 Cyl.	Parlor Car	13	19	11,000	36x6	HP. ^b 36x6	HP. Dual ^g	Intercity	111
Pierce-Arrow.....	6 Cyl.	Parlor Car	1	19	12,400	36x6	HP. 36x6	HP. Dual	Intercity	124
Packard.....	3-35	Sedan	1	11	6,800	36x6	HP. 36x6	HP. Single	Intercity	71
Rec.....	6 Cyl.	Sedan	1	17	7,420	32x6	HP. 34x7	HP. Dual	Intercity	80
Twin Coach.....	6 Cyl.	Street Car	2	34	15,450	36x8	HP. 38x7	HP. Dual	City	80
Yellow Coach.....	Z	Street Car	8	24	11,450	36x6	HP. 36x6	HP. Dual	City	109
Yellow Coach.....	Z	Street Car	2	19	10,580	36x6	HP. 36x6	HP. Dual	City	82
Yellow Coach.....	Z	Double Deck	5	57	12,840	34x7	HP. 34x7	Cush. Dual	City	46
Yellow Coach.....	YZ	Street Car	30	24	11,600	38x7	HP. ^c 38x7	HP. Dual	Intercity 5, City 25	104
Yellow Coach.....	Y	Parlor Car	3	20	11,520	36x6	HP. 36x6	HP. Dual	Intercity	70
Yellow Coach.....	Y	Parlor Car	7	22	13,100	38x8.25	LP. 38x8.25	LP. Dual	Intercity	102
Hudson.....	Super six	Sedan	5	7	3,975	33x6.20	LP. ^d 33x6.20	LP. Single ^h	Intercity	64

* One parlor car.

^a Three have 38x8.25 LP.

^b Two have 36x8.25 LP.

Three have 38x8.25 LP.

^c Two have 36x6 HP.

^d One has 34x4.50 HP.

^e Three have 38x8.25 LP.

^f One has 38x7 HP single.

^g Two have 36x8.25 LP dual.

Three have 38x8.25 LP dual.

^h One has 34x4.50 HP.

Note: HP = high-pressure tires.

LP = low-pressure tires.

MILWAUKEE BUS OPERATION ROUTES, MILEAGE AND ROAD CONDITIONS

Routes	Mileage One Way	Mileage per Day			Condition of Streets	Routes	Mileage One Way	Mileage per Day			Condition of Streets
		Monday to Friday	Saturday	Sunday				Monday to Friday	Saturday	Sunday	
<i>City Operation</i>						<i>Intercity Operation (Continued)</i>					
Oklahoma Avenue.....	2.8	405	388	319	Concrete	Milwaukee-Janesville....	74.2	148	148	148	85 per cent concrete.
Lincoln Avenue.....	3.6	944	973	768	Concrete						15 per cent macadam
Clement Avenue.....	.85	175	153	114	Concrete						Concrete
Mitchell Street.....	1.68	485	518	362	55 per cent asphalt	Milwaukee-Hales Corners	6.7	65	79	....	Concrete
					45 per cent concrete	Milwaukee - Madison, Highway 18.....	88.6	530	530	530	Concrete
Lisbon Avenue.....	1.8	349	356	336	75 per cent concrete	Milwaukee - Fondulac, Highway 41.....	62.7	627	627	690	Concrete
					25 per cent asphalt	Milwaukee - Fondulac, Highway 55.....	65.8	263	329	263	Concrete
Wauwatosa-North.....	3.57	469	432	364	Concrete	Fondulac-Green Bay....	60.7	243	243	243	50 per cent concrete, 50 per cent macadam
Wauwatosa-Vliet.....	3.4	334	334	316	Concrete						Concrete
Green Bay Avenue.....	1.9	170	170	158	Concrete	Mayville-Theresa.....	5.6	56	56	56	Concrete
Racine-Oak Park.....	.8	126	126	119	25 per cent brick, 25 per cent asphalt, 50 per cent concrete	Janesville-Beaver Dam... 79.1	316	316	316	316	Concrete
						Janesville-East Troy....	39.4	157	157	157	80 per cent concrete, 20 per cent macadam
Wisconsin-Prospect.....	6.4	1,461	1,585	1,256	Asphalt						Concrete
Wisconsin-Washington....	5.4	703	679	510	Asphalt	Janesville-Watertown... 52.3	105	105	....	....	Concrete
Wisconsin-Sherman.....	5.8	858	829	624	Asphalt	Racine-Beloit.....	69.1	415	415	415	Concrete
<i>Intercity Operation</i>						Racine-Kenosha.....	11.1	377	377	333	Concrete
Milwaukee-Waukesha....	17.9	608	596	596	Concrete	Racine-Sturtevant.....	7.3	146	146	146	Concrete
Milwaukee-Oconomowoc.	31.2	624	810	870	Concrete	Lake Geneva-Burlington	12.0	120	120	120	Concrete
Milwaukee-Hartford....	37.4	224	224	224	Concrete	Madison-Watertown....	38.1	305	305	228	85 per cent concrete, 15 per cent gravel

the number of buses operated increased from seventeen to 76. The first 10-cent city service was started with ten model L Fifth Avenue double-deck buses on the Wisconsin-Prospect route. At about the same time, ten White model 50 chassis with street car type bodies were put into interurban service. Later, five Bender sedan

bodies on model 50 White chassis were purchased for interurban service. These were followed with ten model 15 White chassis equipped with home-built bodies and used on interurban routes. Later, most of this equipment was transferred to city service. In 1923, nine single-deck type J Fifth Avenue equipments, and five double-



De luxe parlor car buses of the Wisconsin Motor Bus Lines, a subsidiary of T. M. E. R. & L. Co., carry passengers over the highways in southeastern Wisconsin

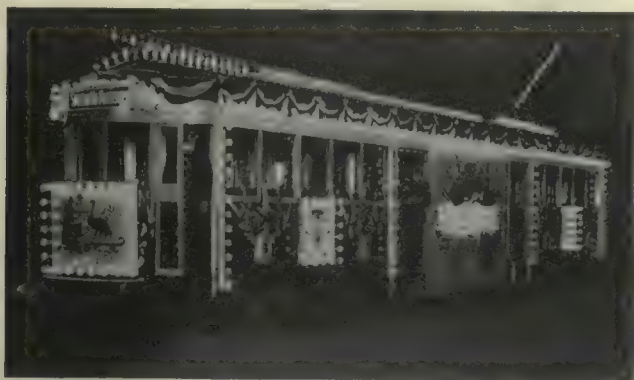
deck model Z Yellow coaches were purchased for the extension of 10-cent city lines. During this year also, ten White model 50 sedans, seven White model 15-40 sedans and three four-cylinder Fageols were added to the interurban equipment. Interurban lines were operated at this period between Milwaukee and Waukesha, Milwaukee and Oconomowoc and Milwaukee to Racine and Kenosha. A number of short feeder lines to interurban rail routes were started about this time, but most of these, together with the Milwaukee-Racine-Kenosha bus line, have since been withdrawn.

During the years 1923-1924, interurban bus lines were started from Milwaukee to Madison, the state capital; Milwaukee to Fond Du Lac, Milwaukee to Hartford, Milwaukee to Janesville, and Milwaukee to Beloit. The first group of five Fageol six-cylinder parlor-car type buses were purchased in 1924. These, together with one Pierce-Arrow parlor car, were operated in long-distance tour service. New purchases of buses for interurban service have all been of the six-cylinder parlor-car type since this time. The present fleet consists of 150 buses of which 141 are in active service. A complete summary of Milwaukee city and interurban bus routes, mileage, equipment and other statistical data is given in accompanying tabulations.

Melbourne Trolley Becomes "Sun on Wheels" to Honor Duke of York

"HITCH your wagon to a star" is what Emerson said, but "Hitch your wagon to a duke" is the way it has been modified at Melbourne, Australia. When the Duke and Duchess of York visited that city the Melbourne and Metropolitan Tramways Board found it possible to honor the ducal couple and give the tramways favorable publicity at one and the same time.

The board was well entitled to any credit it could



Melbourne's "Sun on Wheels" to honor a duke

gain, for there were so many merry-makers on the streets that it was almost impossible to move the cars. Almost every day all trolley traffic was held up for several hours, during which period the platform wages went on as usual. On the day of the arrival all employees were paid time and one-half, with the result that the net earnings were actually 25 per cent under normal. For the ten days complete the tramway earnings were 6 per cent greater and the travel 7 per cent heavier.

If New York thinks it did well by Lindbergh, consider Melbourne's 500,000 celebrants in a city of 1,000,000 permanent population. This was the figure attained on

the day of the big parade, when 25,000 "Anzac" veterans turned out to honor the ducal visitors.

Bourke Street, Melbourne's White Way, was more gayly illuminated than usual, but one of the most striking attractions was the board's car carrying 800 colored lamps and transparencies. The lights clearly showed every detail in private suburban gardens 100 ft. away. So it is not amiss to speak of Melbourne's "Sun on Wheels." The picture tells the rest.

Another Interurban Adds New Cars

The Kansas City, Leavenworth & Western Railway has placed four light interurban cars in service.

Latest de luxe features give cars riding appeal

FOUR new passenger cars, lighter and speedier than those now in use, and designed to appeal to the public's love of comfort and beauty as well as to permit more economical operation, have been placed in service by the Kansas City, Leavenworth & Western Railway Company, operating an interurban line between Kansas City, Mo., and Leavenworth, Kansas. The new cars were furnished by the American Car Company, St. Louis, Mo., and will be operated with one man. The change from the former plan of using two men is part of the policy of cutting down operating costs, adopted as the most effective way of meeting the heavy bus competition the company encounters.

In commenting on the new cars W. H. Holmes, vice-president of the company, said: "We believe that the peak of the depression caused by bus competition has been reached. The electric lines have a legitimate place in the transportation field and by offering the public better service and improved, modern equipment they should be able to win back some of the patronage they have lost. We realize fully, however, that what will help more than anything else is cutting operating costs to the bone and placing the interurban business on a modern basis. We cannot continue with the equipment and methods of twenty years ago."

The four new cars will meet all regular service demands of the company. Most of the present rolling stock will be disposed of, the company keeping only such old cars as are necessary for reserve. The new cars weigh 33,000 lb. each as compared to from 75,000 to 88,000 lb. for the old ones. They seat 52 persons, which is approximately the same as the old, but the passengers will be carried at a great saving in power and in maintenance-of-way.

They embody all the latest features designed to make interurban travel more comfortable and safe and to make the electric car appeal to the public's liking for beauty in common carriers. They are 45 ft., 6 in. long by 8 ft., 6 in. wide, and are equipped with four 45-hp. motors as against four 75-hp. motors on the old cars.

Wheel diameters on the new cars are 26 in. as compared to 34 in. on the old ones. The old cars have cane seats. The new ones have individual bucket-type seats, upholstered in leather, with pneumatic cushions. The new cars have rubber tile floors, all-steel bodies, exteriors painted in red with blue roof, and finished on the inside in two-tone mahogany. An indirect lighting system has concealed lamps in a panel skirting the roof of the car.



Exterior of one of the new cars of Kansas City, Leavenworth & Western Railway. The car is painted red, with cream trimming and blue roof

Light is reflected from a buff-colored, wood pulp combination dome. The roof is arched and the large windows make the new cars appear roomy.

The front vestibules are of the semi-circular type. In the rear of each car is a combination smoking and baggage compartment, capable of seating twelve persons and with a square bus-like vestibule which imparts an observation platform effect. Low stream lines prevail throughout the cars and both front and rear doors are under control of the motorman.

GENERAL REHABILITATION PROGRAM CARRIED OUT

The company has put more than \$100,000 into new equipment and improvements in the last year. Approximately \$25,000 was spent in repaving and repairing car tracks in the city of Leavenworth; \$10,000 in repairing roadbed and putting in new ties and rails between Kansas City and Leavenworth and more than \$5,000 in repairing and putting in new freight switches all along the line.

The new switches will give the company freight connections with the Greater Kansas City railroad switching system, known as the Outer Belt, used by all the rail-

roads centering in Kansas City, Mo., and Kansas City Kan., and their suburbs. They also provide connections with the Missouri Pacific railroad at Wolcott, between Kansas City and Leavenworth, with the industrial department of a home for the blind in Kansas City, Kan., and with the prison industries of the Kansas state penitentiary at Lansing, Kan., as well as with numerous private industries. The company will expand its freight business and hopes to increase its revenues greatly from this source.

The above figures do not include the cost of thirteen buses, purchased within the last three years to supplant the company's electric cars within the city of Leavenworth and to the United States army post at Fort Leavenworth, 6 miles away, and to the government soldiers' home, 3 miles from Leavenworth. The last of these buses were placed in service in October of last year. They enable the company to serve its patrons at these points more cheaply than could be done with the electric cars, and the buses are routed up the streets at the army post and the soldiers' home, bringing transportation nearer to the patrons at these points than was possible with the interurban cars.



Bucket type seats upholstered in leather and rubber-tiled flooring provide comfort for passengers



Rear vestibule of one of the new cars—a longitudinal seat is used here

The Stock Book for Stabilizing Stores

Particulars are given of a simple form of stock book, based on that used on many steam railroads. It has many advantages over the use of cards

By R. A. WESTON
Special Accountant the Connecticut Company, New Haven, Conn.

STEAM railroad companies of the United States 25 or more years ago devised a form of stock book as a means of ordering materials for replacement of stock materials. The advantage of the book was that there could readily be derived from it information on what the consumption of a particular item of material had been over a period of time, so that replacement orders could be based upon the actual history of the past as to consumption. The book quickly grew in favor and is probably the best device now in use for the purpose of regulating the stock. A brief explanation of this form and how it is used may be of some interest.

In its simplest form an outline of the book is as shown

the third column by the storekeeper, who decides upon the quantity to be ordered. He is governed very largely in fixing this quantity by what the book shows is being used.

An illustration will show how he calculates this. On Jan. 1, for the item illustrated, he finds that he has 500 on hand and 300 due on order, and the book shows that during the previous year his consumption averaged 400 a month, or he has on hand and due a 60-day supply. Assume that he decided to order 300. On Feb. 1 he has 200 on hand and 600 due. Not having received any during the month, and his stock having decreased from 500 to 200, he sees that he has issued out 300 during the month. He cuts his order down in February to 200. On March 1 he finds that he has 400 on hand and 400 due. This indicates that he has issued out from Jan. 1 to March 1 the amount on hand Jan. 1 (500) plus the amount received (400) less the amount on hand March 1 (400), or the issues have amounted to 500, an average of 250 a month for that period. He cuts his March order down to 100. He could safely have omitted to order in March. On April 1 he has 550 on hand and 100 due. The consumption in three months has been 750, or an

THE A. AND B. RAILROAD COMPANY																
Description of Material	Average Monthly Consumption Previous Year	JAN			FEB			MAR			APR			December		
		On hand	Due	Order-ed	On hand	Due	Order-ed	On hand	Due	Order-ed	On hand	Due	Order-ed	On hand	Due	Order-ed
Trolley wheels 5 1/2 spec. 0234	400	500	300	300	300	600	200	400	400	100	550	100	100			

This form of stock book has many advantages over card listing

in the accompanying illustration. It is to be noted that there is no column on this form to show consumption of material or material issued. The usual form of stock ledger sheet or stock card has spaces on which all daily issues of stock from the stores are posted and permits of a perpetual inventory. It necessitates a great deal of clerical work.

The stock book here illustrated is used in the following manner. It is kept in the stock room itself and not in an office apart from the stock room. The man who physically handles the stock keeps the book. Once a month there will be prepared in the book a stock-replenishing requisition in the following manner. The storekeeper and the stock clerk will make the round of the stock room. In the first column, for the month in question, headed "On Hand," will be entered the actual quantity of the item in the bin. It will be perceived that this means an actual inventory of the stock room once a month. The bins must be mostly open shelving, with no concealing bin fronts, and the materials physically arranged in order so that they can be counted by inspection without physical handling. The unit piling system needs to be followed.

In the next column, under the word "Due," is entered the quantity previously ordered on requisitions and not yet received. This will consist of all the unchecked items in the preceding third columns, a check mark being made against the item from the receiving record when the material is received. The next entry is to be made in

average of 250 a month for the period. The storekeeper is reducing his monthly orders in order to regulate his stock to the basis of his issues. After the stock room has been gone through and all entries made in the book it is turned over to a stenographer to type up the requisition.

ADVANTAGES SET FORTH

- Some of the advantages claimed for the stock book system as here described are the following:
1. The order is based on personal inspection and inventory of what is on hand. It avoids what may be a costly mistake in ordering from a card record figure where some clerical error may have been made in posting to a card.
 2. It forces an orderly and systematic arrangement of the storeroom and of piling the stock due to requiring an actual inventory monthly.
 3. The psychological effect is good of determining on the quantity to order when facing the material itself and realizing its comparative costliness.
 4. When thousands of items are carried in stock it is a very laborious and slow process to consult individual stock cards for such information. The stock book very much facilitates the work.
- FORM WITH MORE DETAILS FOR LARGE COMPANIES
- The form of stock book here illustrated is in its simplest form and is sufficient probably for a majority of street railway storerooms, and simplicity is quite an advantage. In the form shown, however, it is good for only one year and has to be written up new each year. This can be overcome by having the description column written or printed on a narrow page separate from the rest of the page, removing the latter only, each year.

The principle of the stock book was recommended in the 1923 report of the committee on purchases and stores of the American Electric Railway Association, working in conjunction with the committee on stores accounting, and a recommended form of stock book was included in its report. This form is more elaborate and can be used for two years without rewriting. It has an additional space for showing the amount of unfilled requisitions, which is desirable in the case of a general store supplying divisional stores, but not necessary excepting for such a store. The form recommended by the committee provides for considerable additional information and permits of only seven items of material to a page of rather large size. The simpler form of book would permit of 30 to 40 items to a page of materially smaller size which is quite an advantage. It would also seem as though, with the simpler form, the figures for the calculations are more readily grasped and used. It might perhaps be said that the committee could well have included also in its report a simpler form of stock book that could be used in a majority of cases, while the larger systems would use the more elaborate form in their general storehouses. The report of the committee is referred to for detailed instructions covering the use of the book and for specifications for printing and binding.

As above stated, the system has proved its merit after more than 25 years service on steam railroads, and the opinion is ventured that the electric railways can adopt it in their storeroom practice with great advantage. It of course has to be supplemented by known conditions and work planned and in prospect, and it is the storekeeper's business to be supplied with this knowledge as well as the history of the immediate past.

Detroit Express System Benefits Motorists

Drivers of private automobiles and operators of trucks report big savings in time and general traffic improvement on Jefferson Avenue with express trolley system

DESIROUS of determining whether operators of private automobiles and trucks were benefiting by the combination express trolley and local bus service on Jefferson Avenue, the Traffic Survey Bureau of the Detroit Police Department sent out a number of letters requesting information relative to the use of the avenue before and after the express service was started.

Drivers of private automobiles were requested to give their average time from starting point to destination before express service was in operation, average time under present conditions and any other benefits or disadvantages. Operators of trucks or commercial vehicles were asked to list any benefits or disadvantages of the service to them and to state if any time was saved.

Practically every automobile driver who replied gave a favorable expression of opinion and reported a substantial reduction in traveling time. The time savings ranged from five minutes on a former twelve-minute run to twenty minutes on a former forty-five-minute run. The running times under the new system varied from 55 per cent to 89 per cent of the former times and averaged between 75 and 80 per cent.

Criticism of the system was scarce and concerned two unfavorable conditions: "bottlenecks" are formed at ex-

press stops by requiring traffic to go to the right of the safety zones and traffic signals are masked by the curtains on the safety zones.

A few of the replies from automobile users, typical of the large number received, are reprinted herewith:

Average Time From Home to Place of Employment in Minutes		Benefits or Disadvantages
Former Conditions	New System	
10	7	It's a great thing. I have noticed practically no jamming of cars since new system started. Practically no hold-ups.
35-40	29-30	Driving is easier and less crowded. Traffic moves faster and because there are fewer jams the accident hazard is reduced.
35	22	Fewer quick stops necessary as there are no pedestrians crossing the avenue except at car stops. I consider this express service to be the best improvement in traffic handling in Detroit.
28	23	I find that due to the non-stops the traffic moves more smoothly. General improvement. Good work.
30	24	The avenue is not so congested.
45	30	Think it a great advantage in every way.
40	30	Very much better. A big improvement and hope it is not changed back.
30	20	Much easier driving. Not so many stops and starts.
20	15	The express service has helped the motorist unquestionably.
60	45	I believe the express service has resulted in a time-saving not only to the auto owner but to people who must use street cars, buses or jitneys, as well.
12	7	Traffic moves smoothly without congestion or rush. Plenty of benefits and no disadvantages from the driver's viewpoint.
35	25	I want to endorse the new system heartily. It relieves congestion both for autos and pedestrians.
20	15	It's the best thing the city did since it took over the street railway.
25	15	Formerly used the bus but now use the street car because of a saving in time.

The truck operators who replied were as enthusiastic over the new system as were the private automobile drivers. All reported a saving in time. Many pointed out that they were able to operate more trucks and that operating costs were reduced.

Some of the comments of the operators of commercial vehicles follow:

Is Any Time Saved	Benefits or Disadvantages
A considerable amount	A noticeable speeding of traffic is a result of the express service on East Jefferson. We are pleased that it has been placed in effect.
Considerable	I find it expedites traffic and saves us money inasmuch as we can make more trips.
Yes	It appears to be safer.
Yes	It speeds up traffic and enables us to make more money by being able to carry more loads on our trucks.
Yes	Traffic isn't tied up so frequently. It saves the driver's nerves and patience.
Yes	It saves gasoline by not having to stop and start so often for the street cars.
Considerable	It saves wear and tear on the trucks by not having to stop for street cars every other block.

Rubber Used to Reduce Noise and Vibration on Cars

RUBBER is being used by the Market Street Railway, San Francisco, to reduce noise and vibration in street cars. Pure rubber pads, five-eighths of an inch thick, are used to insulate the car bodies from the trucks, thereby preventing the transmission of gear and other noises to the car body itself. This idea is following out one used by automobile engineers for several years, in using pure rubber pads to insulate the engine from the frame of a motor car.

New cars will be equipped with this device when built, and old cars will be fitted up at the rate of about eight per week.

The adoption of this scheme has followed many weeks of experiments, and tests show an appreciable reduction in noise.

Manuals of Operation and Accounting

By H. E. Jordan

Assistant Engineer Los Angeles Railway, Los Angeles, Cal.

COMPILATION and issuance of manuals of operation and accounting to each employee of the Los Angeles Railway, Los Angeles, Cal., has proved a very effective means of stabilizing the routine of its mechanical department. The primary object of these manuals is to set forth the duties, principles and practices of the department organization and certain general and specific rules for its operation, so that each member of the department may understand the requirements of his own position as well as those of the men with whom he works.

By reading these manuals, new men entering the organization learn the routine and become familiar with the requirements of their jobs in much less time than if they had it all to learn from the foremen and fellow workmen. This not only saves the time of the new men but that of the foremen and the other workmen as well. Men of lower positions may learn from the manuals the requirements and the duties of the positions above them. This gives a man a definite objective to which he may aspire, which is an incentive to an ambitious individual. Many internal conflicts and misunderstandings are avoided by having the jurisdiction of each office defined.

There are two manuals, covering organization, operation and inspection. One is for the five division carhouses that maintain the cars in regular service; the other is for the general shops that repair wrecks, do general overhauling and the work required by store and work order authorizations.



Inspection card rack located in carhouse foreman's office containing last inspection record of each car

The manual for the five division carhouses prescribes the routine rules of the operation of the carhouse organization regarding the proper handling of tools, fire-fighting drills, overtime, absence from work, etc. It sets forth the duties of the general foremen of carhouses and the duties of each office of that department branch, down to the workmen. Further it defines such terms as scrap, salvage and second-hand material, pull-in, equipment and operating failures and describes the use of certain forms that are to be used to make reports of

FROM		TO		Los Angeles Railway Inspection Record		CAR NO.																																																																	
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Each car has a ledger sheet, size 22½x11½ in., with headings for the common items of repair or adjustment. Motor, control and overhead repairs are entered on the reverse side of this same sheet

The company's accounting manual prescribes the general and specific rules pertaining to the charging and crediting of material and the charging of labor. The "Uniform System of Accounts for Electric Railways" prescribed by the Interstate Commerce Commission has been followed. However, some of the operating accounts have been divided into subheads to show certain segregations of cost. For example, Account 30-B represents maintenance of brakes; 30-C, car bodies; 30-T, trucks; etc. In addition to the segregation of charges by accounts, the charges are also segregated by types of equipment. The types of equipment are the same as those used in the inspection reports.

All of these costs are established monthly and are put on a cost per mile basis. However, complete written reports are made only quarterly. Three months is con-



Inspection card in holder on car to be inspected

sidered a sufficient period in which to eliminate severe fluctuations caused by an epidemic of repairs that may occur on any one type of equipment over a short period of time. The quarterly report shows the segregation between regular maintenance and general overhauling charges, summarized by types. Although the regular maintenance costs are segregated only by types of equipment, the general overhauling costs are segregated by individual cars and the detailed cost of overhauling these cars is furnished to the master mechanic's office by accounts. The combination of these two reports has eliminated the guessing or estimating of the relative merit of any type of equipment.

On a large system, where repairs are made by a large number of mechanics at several different points, it is impossible to spot many important weaknesses in the equipment unless classified summaries are made. The inspection report plainly indicates the weakness of the equipment by showing relatively large numbers of repairs and failures under the classified headings. Where these weaknesses are apparent the mechanical department makes an effort to eliminate them, and sometimes by relatively small changes effects a large reduction in operating costs, reduces equipment failures and thus betters the service. The cost report plainly indicates the most economical equipment to maintain. From it the engineering department may readily determine at what point in the life of the equipment it is economical to replace it.

It is vitally essential that every large electric railway keep records of repairs and failures. If these records are not kept up it is necessary to make special studies and investigations regarding the rumored reports of excessive failures and repairs of various types of equipment. When these studies are made, if no detailed record has been kept as the work was done, they are essentially based upon hearsay, or opinions of various workmen and foremen, which is at best a very unsatisfactory means of supporting important conclusions. We believe that it is more economical to keep a detailed record of repairs and failures, so that we may have ready reference on the actual conditions which pertain to all of our types of equipment. This record not only eliminates the necessity of making special studies and investigations but often has called to our attention certain weaknesses which had not been apparent prior to keeping this record.

Training by Individual Instructors in Atlanta

Demonstrations given on a moving car, courses of further study available for those who desire it

TWO features stand out in the instruction course given to new employees by the Georgia Power Company of Atlanta. One of these is an adaptation of some of the latest university methods and is the assignment of each student to one instructor who may have several other students assigned to him but not a large number. This instructor is expected to look individually after the work of each of these students and is held individually responsible for their progress. In collegiate work this is known as the "Oxford" system.

On the Georgia Power System there are two full time instructors and 63 trainmen who have been especially trained as platform instructors, employed in teaching new platform men the way of discharging their duties. As explained, every student is assigned to some one of these instructors. During his course of study he goes to various line instructors to learn the car routes, etc., but he returns to his original preceptor for the final phases of his instruction. Before this plan was begun a student was sent to one instructor one day, to a second the next day and to a third the following day to learn different phases of the work. The result was that no one instructor was responsible for his progress and no one took any great amount of interest in it.

Largely as the result of a scientific approach to the problem, the company has found it possible to reduce the period of instruction by 25 per cent, and at the same time turn out better qualified men. This is of benefit to the company through the more efficient use of the time of the instruction course. It is of equal benefit to the students in view of the fact that they are not paid during their period of instruction. Higher standards of intelligence and character of the applicant also are being required, and it is a real testimonial to a man's physique or intelligence to be selected by the company for the position of one-man operator. It makes the man feel that the job is worth something to him after he has acquired it.

A second important feature of the training course is the instruction car illustrated on this page. It is unique

in that it is a skeleton car, at least on the inside, which can be operated over the road to teach the men the practical working of the machinery. It was remodeled from a four-motor, double-end car which had been retired from passenger service.

The flooring in the center was removed, leaving a walkway protected by a railing on each side. The line breaker is mounted above the floor and the air brake valves and piping are mounted above the center sills and painted a distinctive color. Door hinges, sprinklers and valves forming a part of the treadle step and door mechanism are exposed. The power wiring and door circuits are also exposed. The controller has a glass cover. The car is equipped with an economy meter and a voltmeter so that more intelligent instruction in power saving may be given.

A group switch in the car is controlled remotely by eight snap switches, the snap switches opening and clos-

Those who finally qualify for service have the opportunity of pursuing their education further if they desire to do so. The men are encouraged to take correspondence courses relating to the public utility industry. The cost of such courses may be deducted from an employee's salary if he desires, and if he completes the course and makes a grade of 70 per cent or better the amount so deducted is refunded to him. The company also assists employees desiring to take night school or other courses, by arranging their hours of work. It was discovered a few years ago that 34 motormen could neither read nor write. Special classes for them were organized and all were given the rudiments of an education.

For the last three years the superintendent of equipment, his foremen and several of the point supervisors have attended a course in foremanship at the Georgia School of Technology. The results were so satisfactory during the first two years that in 1926 the company



This old car has been fitted out for instruction purposes. The floor has been cut away to show the operation of the machinery. The wiring, air valves and other parts are also visible

ing the unit switches in the group. The unit switches are used to demonstrate the most frequent troubles in the motor circuits, i.e., grounded armatures and fields, open circuited armatures and fields, grounded and open circuited resistances and short circuited fields and resistances.

The car is designed so that the instructor, by throwing the switches, can cause the various kinds of trouble. The student is then told how to operate the cut-out switches in the controller to clear up the trouble. After all parts of the mechanism of the car have been explained to him, the student is required to correct the various troubles and get the car in operation after the instructor has thrown it out of order.

The instruction of the men does not end with their technical training. Every man before qualifying has a talk with the safety director, who seeks to impress upon him the primary obligation of safety and his responsibility as a representative of the company. He then meets the superintendent of transportation for a personal talk. The company believes the benefit of these interviews cannot be overemphasized, as the student comes from them not only with a feeling of the importance of the job but with a knowledge that the officials, from the superintendent down, are backing him in his efforts to make good.

made arrangements for the entire supervisory force of the transportation, roadway and mechanical departments to take this course at the same technical school. The men attended on their own time and an average attendance of more than 90 per cent was maintained.

P.R.T. Remarkable Example of Employee Participation System

THE Philadelphia Rapid Transit Company, Philadelphia, Pa., is cited as the most remarkable example in the United States of employee participation in management in a survey recently completed by the International Labor Office of the League of Nations. According to the report that company is particularly striking, "as the employees are in process of acquiring complete financial control." The 10,000 employees already hold more than one-third of \$30,000,000 of capital, giving them two directors of eight on the board of management. In conclusion, the report states that the communication of information to workers' councils and the sharing with them of some of the anxieties of management have led to a better understanding of problems of industry by the workers.

The study was made by H. B. Butler, C.B., deputy director of the International Labor Office.

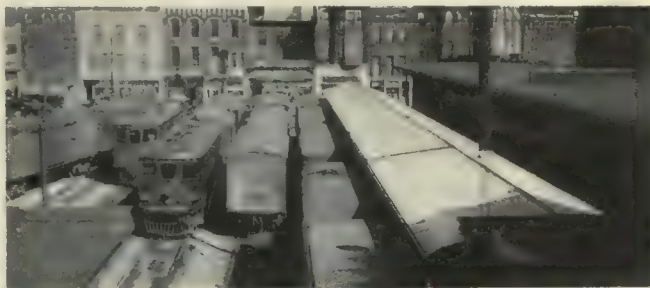
Columbus Freight Terminal Enlarged

Steady increase of freight business made the former building inadequate. Receiving capacity has been increased 70 per cent

FREIGHT-HANDLING facilities of the Columbus Interurban Terminal Company were increased considerably by the enlargement of the previously-congested terminal. An extension, 41 ft. wide and 65 ft. long, was built on the freight house and the yard capacity increased to accommodate 30 cars. The extension has permitted an increase in floor space of 65 per cent, and an increase in the receiving capacity at the door of 70 per cent.

The effect of the changes was noticed immediately by the three roads which use the terminal, the Indiana, Columbus and Eastern Traction Company; the Southern Ohio Public Service Company, and the Columbus, Delaware & Marion Electric Company. Overnight service traffic between Columbus and the cities of Springfield, Cincinnati, Dayton, Fort Wayne, Detroit and Cleveland, as well as many intermediate cities, has picked up since the changes were made, according to reports. Before the terminal was completed many complaints were received from connecting lines about congestion. Since the new terminal has been placed in service, no more complaints have been received, it is stated, and many patrons have indicated that they were highly pleased.

Prior to 1911, all freight tonnage in and out of Columbus was small as compared with that of today. However, the terminal then in use was inadequate and a new one was constructed. The new freight terminal exceeded the abandoned station many times in size and exceeded the need of that day, but the management foresaw a sufficient increase in freight business to warrant the larger building. The terminal constructed in 1911 provided ample space for the efficient handling of freight, both in and outbound, until about 1922 or 1923 when congestion became quite noticeable. With the year 1926, which was the banner freight year of the company, the terminal was found to be inadequate and congestion



Track facilities of the terminal have been increased to accommodate 30 cars



The passenger station and the adjoining flatroofed freight house are back of the transfer shed in this view

was an every-day occurrence. Often three or four cars were standing under load in the yards from 24 to 48 hours.

Completion of the enlargement of the terminal was the occasion for an inspection and "get-together" party at Columbus, Ohio, Oct. 27, attended by traffic representatives of most of the electric railway properties of Ohio, Indiana, and Michigan, shippers of Columbus, representatives of civic organizations in Columbus, and officials of the Indiana, Columbus and Eastern Traction Company, who sponsored the party. Details of this meeting were given in a news item appearing in the Dec. 24, 1927, issue of the JOURNAL.



Seventeen service doors are provided in the present terminal for inbound and outbound freight

Buffalo Transfer Embodies New Features

Design recently adopted to meet conditions of International Railway, including use of one-man cars and universal privileges

By P. C. SNOW
Vice-President Globe Ticket Company

EVERY transfer system, good, bad or indifferent, must include certain essential features, which are: (1) The date the transfer is issued; (2) the route or routes to which a passenger may transfer; (3) the time when the transfer privilege expires. The care taken in presenting this information determines in large measure

P.M. This Coupon denotes that hour punched on body
007804
of transfer is P. M. HOUR
Not good if detached

NO ADDITIONAL TRANSFERS ISSUED ON THIS TICKET

JEFFERSON-18 IN

THIS REGULAR TRANSFER issued ONLY at time of paying fare, and on Pay as You Leave Cars ONLY at transfer points. Good for a continuous ride on first car leaving proper transfer station within time limit punched. NOT TRANSFERABLE. See Back.

THU JUNE 2, '27

12 1 2 3 4 5 6 7 8 9 10 11 12

12 noon

TRANSFER REGULATIONS

1. This Special Transfer issued ONLY at time of paying fare, and on Pay as You Leave Cars ONLY at transfer points. Good for a continuous ride on first car leaving proper transfer station within time limit punched. NOT TRANSFERABLE. See Back.

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12. This Special Transfer issued ONLY at time of paying fare, and on Pay as You Leave Cars ONLY at transfer points. Good for a continuous ride on first car leaving proper transfer station within time limit punched. NOT TRANSFERABLE. See Back.

A MISDEMEANOR

Issued at time of the Year Card

Not to be used on transfers

P.M. This Coupon denotes that hour punched on body
001479
of transfer is P. M. HOUR
Not good if detached

NO ADDITIONAL TRANSFERS ISSUED ON THIS TICKET

JEFFERSON-18 IN

THIS SPECIAL TRANSFER issued ONLY at time of paying fare, and on Pay as You Leave Cars ONLY at transfer points. Good for a continuous ride on first car leaving proper transfer station within time limit punched. NOT TRANSFERABLE. See Back.

THU JUNE 2, '27

12 1 2 3 4 5 6 7 8 9 10 11 12

12 noon

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A MISDEMEANOR

Issued at time of the Year Card

Not to be used on transfers

Front and reverse of new Buffalo transfers

The regular transfer (at top) is good on one car only, while the special transfer is accepted on two cars. In a few instances additional transfers are issued.

the success or failure of the transfer system. Adherence to the basic principles involved will go a long way in cutting down, if not eliminating entirely, many of the transfer evils which long have been the bane of transportation men.

The transfer designed and laid out for the International Railway, Buffalo, N. Y., in co-operation with its transportation engineers, is an excellent example of how these results may be accomplished. The study was directed by two engineers, but the employees, including co-operative committeemen, supervisors and trainmen, had no small share in the development of the transfer. In the opinion of the writer as close to a perfect transfer for the purpose as has yet been done has resulted. Whether the idea they have worked out can be adapted satisfactorily and used by all roads throughout the country is a question. However, it has been in use in Buffalo for several months and it is reported that results have been most gratifying in every way.

The accompanying illustrations show the two forms in use. The first or regular transfer is good on any line intersecting the issuing line, and requires no line punching. The second or special transfer is issued to cover rides requiring three or more cars. The operator punches the intersecting line, and on that line the stub is lifted, the passenger retaining the body of the transfer, which is collected on the third car. In a few rare instances riders may require four or five cars to make a journey. For these rides the issuing operator punches the word "issue." Only when this word is punched out of a special transfer does the operator of the second or later car issue a transfer on a transfer.

At the beginning of each half trip operators punch out the time, allowing a reasonable margin to cover slight delays in making connections. Thus all punching except for the unusual ride is eliminated from the line, greatly speeding the issuing of transfers. There has been a material simplification from the former transfer. This reduces the time taken by the issuing operator and makes it easy for the receiving operator to scan the transfer on acceptance. This reduction in time is essential for one-man operation, and at the same time decreases abuse given both by operators and by passengers.

The form adopted is what is known as a "line" transfer, the issuing line being indicated by color and by printing in large letters on the face of the form. The issuing date is surprinted in red on the face. On the regular form the transfer point and route are not punched, but instead inbound and outbound forms of different colors and with distinctive printing are used. On the reverse of the transfer is a list of the legitimate transfer routes and points allowed. The receiving operator has no difficulty in identifying the transfer and determining whether it is good on his line at the stop where the passenger boards and in the direction in which he is traveling.

Buffalo has adopted the hourly time limit, following the trend toward simplification. It has been found by experience that this restricts the passenger with a reasonable degree of accuracy, and it is felt that the fractional hour limit is not practicable for pay-as-you-pass and pay-leave collection, both of which were used in Buffalo when the new transfer was first employed. Buffalo cars are now 100 per cent one-man operated, and with the exception of four crosstown lines the method of fare collection is pay-enter inbound and pay-leave outbound. It is also easier for the issuing and receiving operators, particularly on one-man cars, to punch and inspect the hourly limit. As to the abuse, there is comparatively little to be lost with the hourly basis, since the average conductor is usually liberal when punching the fractional-hour transfer. The use of transfers long expired is obviated by the "P.M. coupon," which is torn off all transfers issued before noon. The difference in length and appearance is unmistakable.

Preceding the introduction of the new transfers, a series of newspaper advertisements prepared the public for the change. These advertisements illustrated both the regular and special forms of transfers, and discussed the conditions of use, telling the patron what to do to obtain the correct transfer. These were published in the daily papers for four days preceding the inauguration of the new system. Beside this, dash signs called attention to the newspaper advertising. The day the new transfers made their appearance the dash signs carried the wording, "Need a Transfer? What Lines, Please?" Bulletins in the cars also called attention to the new form.

Maintenance Methods *and* Devices

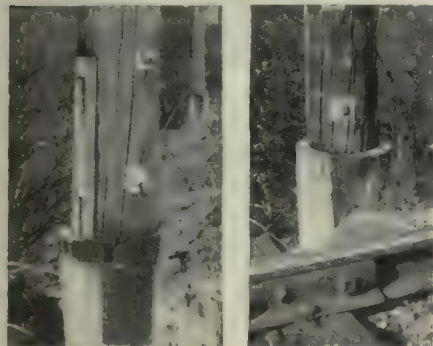
Poles Butted With Reinforced Concrete

POLE butts of reinforced concrete have preserved for use almost 1,000 poles of the Pittsburg, Harmony, Butler & New Castle Railway and the Pittsburgh, Mars & Butler Railway. The method was devised by Harry Etheridge, vice-president

3 in. long are welded to rings, as shown in the accompanying drawing. The lower ring has a diameter of 6 in. and the upper ring a diameter of 9½ in. Two bars 4x½x30 in. project from the lower framework and are welded to the lower bars just above the upper ring, as shown in the upper section view of the line drawing. They are at an angle of 90 deg. to each other and are drilled for ⅞-in. bolts. Two bolts through each of the two tongues hold the sawed-off pole securely in position.

With the reinforcing framework in place, a specially constructed concrete form is clamped about the base. The form is 6 ft. high, of No. 16 galvanized-steel and in two halves, with flanges so the halves can be held together by external bolts. Fabric gaskets ¼ in. thick are used between the faces. The inside diameter at the bottom is 10 in. and at the top 14 in.; so a layer of concrete approximately 2 in. thick surrounds the reinforcement in the completed butt.

A ring 3 in. wide and with a diameter of 14 in. is molded in the butt near the top and acts as an outside reinforcement. Three ⅝-in. rods 8 in. long in chordal positions within the ring further reinforce the concrete at this point. The completed butt weighs 756 lb., of which 105 lb. is metal and 651 lb. concrete.



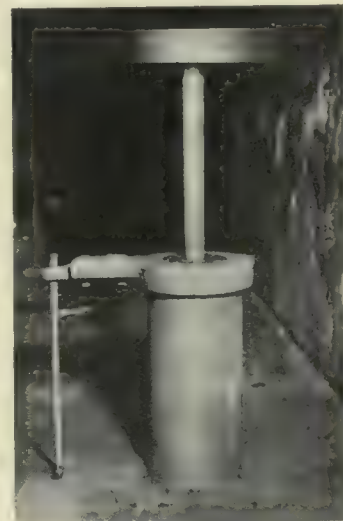
Two views of the completed butt, showing how the pole is bolted to the projecting tongues

and general manager of the companies. The method is economical, costing only \$4.50 per pole. It is convenient as well, since the butts can be produced without disturbing the transmission or overhead.

The reinforcing framework is constructed of open-hearth steel bars and rings. Three bars 2x½ in. and 5 ft.

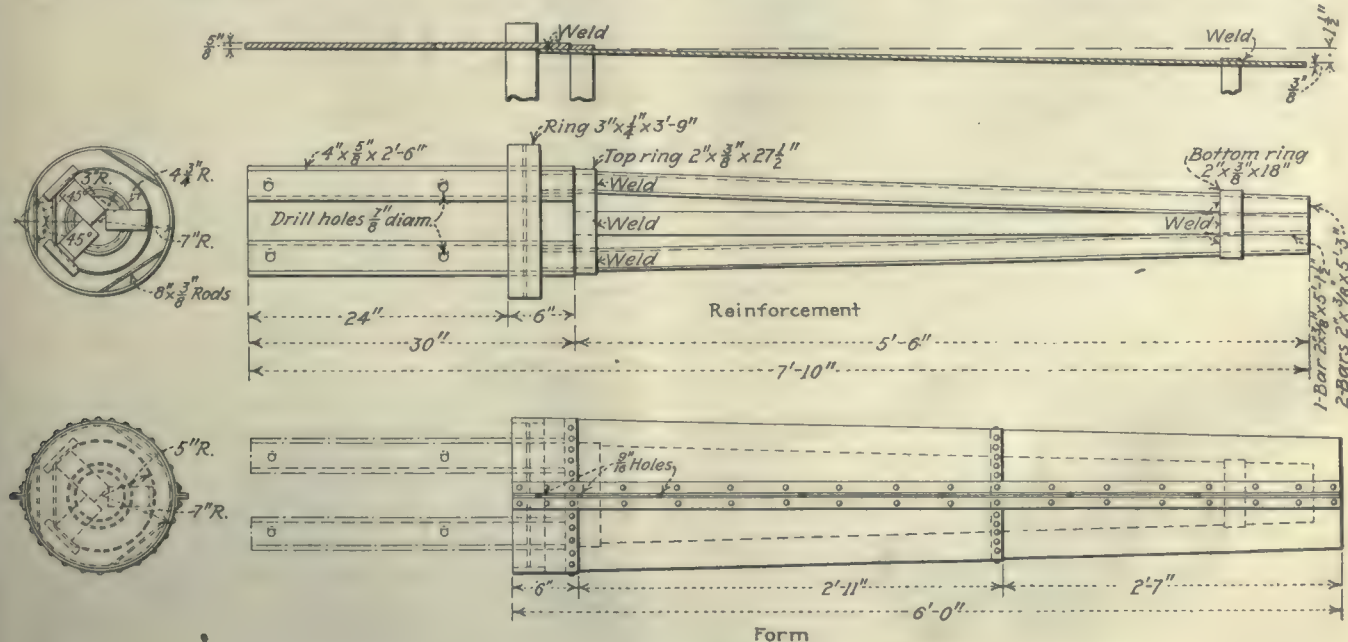
Hydraulic Armature Jack

REMOVAL and installation of armatures is done in considerably less time in the shop of the Binghamton Railway, Binghamton, N. Y., since the installation of a hydraulic



Jack in overhauling pit is an added convenience

armature jack. This jack, which is placed in the center of the pit floor, consists of an 8-in. iron pipe 6 ft. long, threaded on one end and set vertically so that about 3 ft. projects above the floor level. A 2-in. steel piston on one end and an oak plat-



The metal reinforcement and the concrete form used in the work. The upper section view shows how the tongues are welded to the lower bars

form on the other are installed in this pipe. The exposed end of the 8-in. pipe has a casting screwed on it which acts as a piston stuffing box and a support for the valve operating handle. A 2½-in. pipe connected to the city water system and the lower part of the 8-in. pipe through a ½-in. globe valve furnishes the water.

The operating handle moves in two directions. When it is thrown to the right it closes the drain valve and opens the city water valve, thereby raising the piston. When it is thrown to the left it closes the city water valve and opens the drain valve, lowering the piston. The motion of the piston can be stopped at any point desired by placing the handle in the neutral position where both valves are closed. The jack has a 5-ft. lift.



This table, with a rack in the center, facilitates the cleaning of car window sash

Controller Segment Cutting-Off Jig

CONTROLLER segments are being made at a substantial saving in the Woodside shops of the New York & Queens County Railway, Jackson Heights, N. Y., by the use of a simple device designed by controllerman John Hilbert. Burned controller segments formerly scrapped are now salvaged by cutting off the burned portion and using the shorter segment in other parts of the controller. This device is a cutting-off jig and is designed for cutting two lengths of segments. It is made of steel in two parts, *A* and *B*, as shown in the accompanying sketch. The main body *A* has a diameter of 4 in., is 3½ in. long, and has a 6-in. flange ⅛ in. thick. Slotting of the flange radially in two places permits the entrance of a hack saw blade to cut the segment to the proper length. The

3½ in. surface of the hub is drilled and tapped for two ¼-in. machine bolts to hold the different lengths of segments. The 4-in. surface is drilled and tapped for a ⅜-in. bolt and provided with two ¼-in. dowels. The ½-in. plate, *B*, is drilled and slotted to line up with the slots, dowels, and topping in the hub of *A*. Plate *B* is designed so that the bottom edge stops above the center of *A* to allow for its application and removal without withdrawing *A* from the vise.

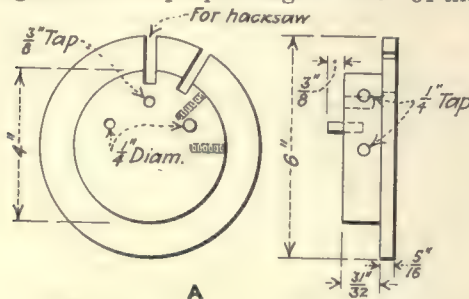
Convenient Stand for Washing Sash

WHEN car sash are washed prior to installation, for the purpose of removing surplus paint, varnish or putty, it is often difficult to manipulate them so that all parts can be reached readily. To obviate this difficulty Joseph Gabler, foreman painter of the Twin City Rapid Transit Com-

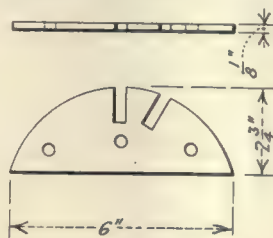
pany at the St. Paul, Minn., shops, has designed and built the table illustrated. The bottom portion is an ordinary, sturdily built work table with drawers for holding tools and a shelf beneath. On top of this in the middle of the table there has been mounted a wooden rack, the height of which is correct for resting the sash at a convenient angle. Vertical rails make it equally suitable for smaller sash also. Notched cleats are fastened to the table top so that the sash will not slide off when rested against the central rack. Hinged extension shelves are fitted at the two ends.

Ventilated Welding Rod Holder

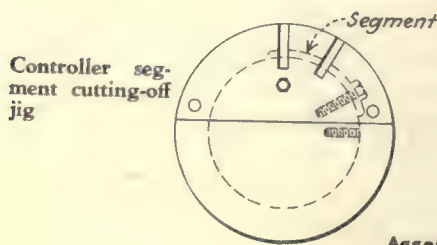
HOT WELDING-ROD holders have caused considerable complaint from the operators of the shop and maintenance of way departments of



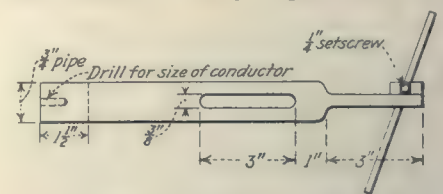
A



B



Assembly



Details of ventilated welding rod holder

the Binghamton Railway, Binghamton, N. Y., until Foreman Chapman designed a ventilated holder to eliminate the objection. It is claimed this holder can be used for any length of time under severe welding conditions and that it will remain at a temperature which will not cause discomfort to the operator's hands.

It consists of a ¾-in. pipe 16 in. long, flattened on one end for about

3 in. A rectangular block riveted to the flattened end is drilled for reception of the welding rod. A hole at right angles to this one, drilled and tapped for a $\frac{1}{4}$ -in. setscrew, holds the welding rod in any desired position. The other end of the pipe is filled with brass to $1\frac{1}{2}$ in. from

the end and is drilled for the conductor cable. The feature of this holder is a $\frac{3}{8}$ -in. by 3-in. slot cut through the walls of the pipe beginning about 4 in. from the end of the holder. This hole acts as a ventilating duct or port for the dissipation of the excess heat.

New Equipment Available

Another Gas-Electric Bus

COMPLETION of design of a gas-electric drive motor bus has been announced by the White Company, Cleveland, Ohio. Several months of test have shown unusual power for the new equipment, it is claimed, and have demonstrated hill-climbing ability which permits severe schedules to be maintained without overheating.

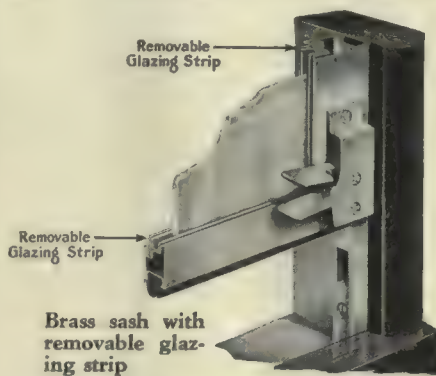
The White six-cylinder 100 hp. engine has been modified and fitted with a new chassis for gas-electric service. Electrical equipment was developed in conjunction with the General Electric Company. The six-cylinder power plant permits larger and more powerful electrical equipment than has been customary. The new bus will carry a full load of passengers on fast bus schedules over hills which would tax the capacity of ordinary equipment. Although not designed for long distance work over open routes with few stops, it is suitable for routes combining suburban and city traffic conditions, and for intercity service.

The chassis is a complete unit, making it possible to mount bodies without alterations to the chassis wiring. In addition, attention has been given to the mounting of the motors and generators so that the work of removing any unit is simple. The generator is driven by a flexible steel shaft which runs through the generator to the commutator end, the drive being taken through rubber ball joints. The two motors are connected

to the underslung worm-drive rear axle by short universal joint shafts, and the propeller shaft brakes are mounted directly on the rear end of the motor, thus forming a part of the motor design.

Sash With Removable Strips Make Reglazing Easy

WHEN brass window sash made its appearance some years ago, there was no provision made for quick reglazing in case of glass breakage. To provide for easy reglazing,



the O. M. Edwards Company, Syracuse, New York, has announced a metal sash with removable glazing strips. With this feature, a new glass may be inserted quickly without removing the sash from the opening.

To insert a glass, sash strips are removed from the two side stiles and top rail, the new glass is placed in the opening and the strips are reinserted in their grooves. No screws are used to hold the strips in place.

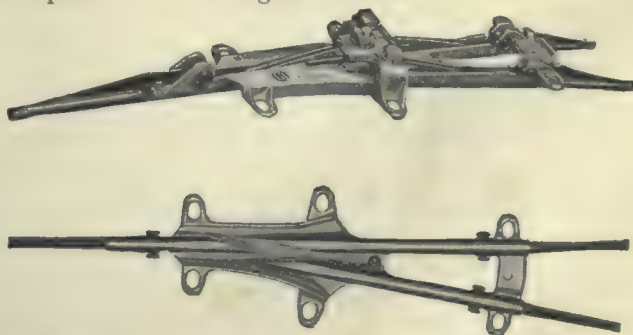
Duplex Trolley Frog With Detachable Pan

EASE and rapidity of replacement are features of the new Duplex trolley frog now offered to the trade by the Ohio Brass Company, Mansfield, Ohio. With this construction, a detachable suspension yoke and clamp become a permanent part of the overhead and permit replacement of a frog without disturbing the supporting span or trolley wires or losing the exact location of the frog being replaced. The suspension yoke is supported by cross-span wire for which pull-off eyes are provided. To this yoke is fastened by means of a $\frac{5}{8}$ in. bolt the clamp which holds both trolley wires in relative positions. The frog itself is in turn attached to the yoke by two $\frac{5}{8}$ in. bolts.

To make a replacement by installing the new frog the body or pan is released by removal of two bolts and the cam tips. With a Duplex frog in position there is no need to disturb supporting span or trolley wires when renewals are made since relocation and realignment need not be considered.

Long life is assured by special runners of liberal height, narrow cross-section and with extended overlap at the center of the pan. The runners are designed primarily to guide the wheel through the frog without break in contact and without permitting the flanges to touch the pan at any point. Current collection by the wheel alone, not by the flanges, results in longer wear for both frog and wheel. The Duplex frog and body suspension yoke are made of Flecto malleable iron, hot-dip galvanized, rust resisting and brittle free. The frog body is also equipped with pull-off eyes at each end for use when necessary and with the usual O-B cam tips which insure a smooth approach and leave. The same yoke is suitable for both right and left hand frogs.

The new type frog can be furnished for the usual sizes of round and grooved wires.



New duplex trolley frog

Special runners are provided of narrow cross-section and with extended overlap at the center of the pan.

Association Activities

The Place of the Interview in Selection *

By DR. S. M. SHELLOW
Psychologist, Milwaukee Electric Railway
& Light Company

IN OUR zealous effort to introduce scientific methods in the selection of employees, we are likely to throw out any former devices which smack at all of subjective judgment. Those of us who have succeeded the old-time employment clerk with his systematized prejudices and intuitive hunches, have laid great stress on the error of personal judgment. So much effort has been expended in trying to correct the evils of the old-time personal interview by substituting objective tests that we have often leaned over backward in trying to stand up straight.

There can be no doubt of the value of properly standardized tests in determining fitness for a job, especially when they are checked by careful and reliable follow-up reports. But the test alone is insufficient. Again and again we find individuals who lie beyond the 60 or 70 correlation coefficient who do poorly in a test but make good on the job, or do well in tests but fail on the job. We might consider them as necessary errors in any selection procedure, or we might study the causes of success and failure and see whether or not they cannot be anticipated in selection.

There are still many traits which are necessary for the proper suitability to a job which cannot be adequately measured by tests. Personality is something more than a combination of various quantities of different traits. The whole may be qualitatively different from the sum of all of its parts. Behavior cannot be predicted simply on the basis of sufficient ability. There is a great difference between the ability to do a thing well, and the interest, desire and ambition necessary to employ that ability. Attitude greatly influences performance.

The interview is designed to supplement and interpret the test results. Its value depends upon its nature. Interviews range from rapid-fire cross-examinations to the thorough and careful searching of the personality characteristic of the psychiatric clinic.

Somewhere between those two extremes lies the practical interview for selection. The nature and extent of the interview depends entirely upon the nature of the job and the qualities which need to be brought out. There are, however, certain primary functions of an interview which make it an integral part of good selection procedure.

In the first place, the interview serves as a shock absorber. It establishes a friendly relation and understanding between the examiner and the applicant. It lends a personal interest atmosphere. The initial contact should be with this purpose in view, to put the applicant at ease so that his test results may not be effected by nervousness. An easy-going conversation about the applicant's past experience, reasons for applying for the job and whatever personal information is required can quickly establish good rapport as well as provide material for later filling in the face sheet or application blank.

THE NATURE OF THE INTERVIEW

Many important items which lead to conclusions as to the possible permanency of the applicant can be tapped during the interview.

The objection might be made that much of this information can be obtained by having the applicant fill out a blank. It is true that the information can be so obtained, but the proper introductory atmosphere for testing cannot be so established. And often much richer results are obtained in conversation about previous experience than in simply an itemized statement.

For many simple jobs, especially of a clerical nature, such an introductory interview is sufficient. The test results are paramount.

As the job becomes more complicated, the value of the interview increases. Especially is this true with jobs which require contact with the public.

There are many tests which attempt to get at "social intelligence." Some of them are helpful and suggestive, but they are indirect methods at best. Often the questions are answered as the applicant believes he is expected to answer them, and they do not represent his actual behavior in the given circumstance. The most direct measure of social ability is an actual social situation. An interview is such a situation. It is essentially the meeting of two personalities with different background and purpose. Its possibilities depend upon the training and the ingenuity of the interviewer.

A few examples may serve to illustrate the difference between testing social reactions through the interview method and through objective standardized tests. We will take the example of selecting a bus operator. The job divides itself into two major parts—ability to operate a bus and ability to deal courteously with the public. The first has

been successfully measured by objective tests. For the past five years I have tried to find adequate objective measures for the second. Several of the current tests have been tried, as well as some which I devised myself. I have gone back to the interview method. The reason will be clear after an illustration or two.

Take the question: "What would you do if a lady got on your bus and gave you a counterfeit dime?"

Objective method:

1. Put her off the bus.
2. Say nothing and give it in change to someone else.
3. Call her attention to it and ask for other money.
4. Report her to the police.

This question can be answered by checking any one of the four statements

The possibilities of behavior are circumscribed. They include only four ways out. Chance operates. Take this same situation in an interview.

Question: What would you do if a lady boarded your bus and gave you a counterfeit dime?

Answer: I would not take it.

Question: What would you say?

Answer: I'd tell her it wasn't no good, and ask her for another one. (Note incorrect English—need for class in Practical English.)

Question: Suppose she was very much surprised when you told her it was no good and looked into her purse to get another one, and that was all she had?

Answer: Well, she'd have to get off.

Question: How would she get home?

Answer: That's not my business, she has to pay or get off. I couldn't let her ride for nothing.

Now why does he make this decision? Is it because he thinks it is what is expected of him, and he wants to make a good impression? Or would he actually put the lady off? Let us push it a little further.

Question: How do you think she would feel toward the company if you put her off a bus because you said her dime was not good?

Answer: Well, I guess she wouldn't like it.

Question: Part of your job is to get along nicely and make friends for the company. Couldn't you think of some other way to handle that situation?

Answer: Well, I could let her ride then.

Question: That isn't allowed. You'd lose your job if you permitted anyone to ride without a fare.

Answer: Well, I guess I could loan her a dime then, and she could pay me back.

The result of this interview shows that the applicant is trainable. He can be made to appreciate good public relations.

Other hypothetical situations bring out other characteristics. Hot temper, willingness to fight, impudence, all of these often creep through unguarded.

*Abstract of paper presented at the convention of the American Psychological Association, held at Columbus, Ohio, Dec. 28, 29 and 30, 1927.

In a paper test they might easily be covered up.

The value lies in the elasticity. The questions are constantly shaped to bring out the attitude of the applicant. It is obvious that in order to gain results, the interviewer must be familiar with such psychological process as suggestibility, defense mechanism and the like. A background of clinical experience is extremely helpful.

CHECKING RESULTS

It is quite possible, and indeed often happens, that an applicant may have sufficient ability to pass the objective tests but lacks the proper attitude or personality for the particular job. It is the function of the interview to supplement the test results. Many an applicant has been rejected on the basis of the interview.

But interviews must also lend themselves to verification through follow-up record. It is possible so to record the interview results that follow-up forms may be designed to correlate with them. For example, in the case of public service, such expressions as these might appear on the follow-up record sheet which is sent to be checked by the department head or supervisor:

1. Actively courteous (makes a distinct effort to bring out good public relations).

2. Passively courteous (answers questions courteously, but does not take initiative).

3. Apathetic (has shown little tendency toward courtesy, though not actively discourteous).

4. Actively discourteous (has bad complaints).

In recording the results of the interview, the same phases can be used—and later checked against the follow-up reports. Verification and disagreement serve to guide the interviewer in the future.

In the present state of objective selection procedure, we cannot rely entirely on test results. The careful observation of an intelligent and trained interviewer is invaluable in interpreting test results in the light of the particular individual in question, as well as venturing at a prediction of future success.

Group Meetings Stressed in Oklahoma Meeting

GROUP meetings will be stressed in the tenth annual convention of the Oklahoma Utilities Association at the Mayo Hotel, Tulsa, March 13, 14 and 15, according to E. F. McKay, manager of the association and chairman of the convention committee. Seven groups will hold separate meetings during the afternoons, and the general sessions will be held during the mornings. The groups will be the telephone, electric, gas, electric railway, public relations, manufacturers, suppliers and womens' committees. Papers and addresses throwing light on various operating and public relations problems will be presented to each group.

COMING MEETINGS OF Electric Railway and Allied Associations

March 6-8—American Railway Engineering Association, annual convention and exhibit, Chicago, Ill.

March 13-15—Oklahoma Utilities Association, annual convention, Tulsa, Okla.

March 14-15—Illinois Electric Railway Association, Springfield, Ill.

March 21-22—Central Electric Traffic Association, Seelbach Hotel, Louisville, Ky.

March 23—Maryland Utilities Association, annual meeting, Emerson Hotel, Baltimore, Md.

March 30—Executive Committee American Electric Railway Association, 292 Madison Avenue, New York, N. Y.

April 26-28—Missouri Association of Public Utilities, Jefferson City, Mo.

May 2-5—Southwestern Public Service Association, Dallas, Texas.

May 6-12—Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome, Italy.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 20-27—American Railway Association, Div. 5—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association), annual convention and exhibit, Atlantic City, N. J.

June 21-22—American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

SEPT. 22-28, 1928

American Electric Railway Association, 47th. annual convention and exhibit, Cleveland, Ohio.

Indiana Utility Association Reorganizing

SINCE Oct. 1 the Indiana Public Utility Association has been in the process of reorganization. The old information bulletins have been stopped and a new information bulletin will be established early in 1928.

During 1928, according to an official bulletin, the Indiana Public Utility Association by its acts and its viewpoint will endeavor to be one of the most active and influential business and industrial associations of Indiana. To this

end committees to direct the various activities of the association have been organized and are working. Particularly active since Nov. 1 has been the tax committee. H. S. Morse, of the Indianapolis Water Company, is chairman. The committee already has taken part in the general effort being made in this state to study the taxing situation. Mr. Morse takes a stand for a more scientific taxation system and has pledged the support of the association toward every effort for tax honesty and equity.

Ernest Van Arsdel, president Interstate Public Service Company, has been appointed chairman of the association's advertising committee. C. L. Kirk is now chairman of the association's committee on membership and finance.

American Association News

Electric Railway Finance

NEW car financing was the principle subject of discussion at the organization meeting of the committee on electric railway finance, held at association headquarters in New York on Feb. 24. Those present included the following: Luke C. Bradley, chairman; J. G. Barry, S. M. Curwen, P. W. Winslow, E. A. Tuson, representing Percy S. Young, J. W. Welsh, J. A. Miller, Jr., and Charles Gordon.

The committee devoted its attention to determination of the factors which affect the ability of electric railways to finance new car purchases out of earnings. Chairman Bradley held that the advantages of new cars have been demonstrated on many properties, but that the problem of financing such purchases out of earnings is a difficult one for some properties. Since the restricted credit of electric railways, attributable in many instances to unwieldy financial structures, stands in the way of securing capital for the purchase of new equipment, he felt that acceleration of the industry's recovery is contingent on devising means to make it possible to finance such equipment out of earnings. The experience of properties that have obtained new cars shows that they permit reduction of operating expenses and stimulate improvement of the many factors in railway operation ranging from public and employee relations to volume of riding.

Based upon this preliminary discussion the committee decided to devote its attention to the problem of encouraging the purchase of new cars out of earnings. This program was adopted on the assumption that some properties do not find it practicable to finance new car purchases out of earnings on the present customary terms. It was agreed to undertake the study of several typical properties to determine the basis on which new equipment could be financed and to investigate the possibility of broadening existing facilities for handling equipment trust obligations.

News of the Industry

Fare Changes Sought in Green Bay

Permission to increase the price of strip tickets to six for 50 cents and to abolish the city ride book with the cash fares remaining the same will be sought by the Wisconsin Public Service Corporation, Green Bay, Wis., from the Wisconsin Railroad Commission. The company now charges a 10-cent cash fare, and sells strip tickets four for 25 cents, and city books containing tickets for \$2.50. On the interurban lines zone tickets are sold in 40-ticket books at \$3 a book, and permission is asked to increase the price to \$4 per zone book of 40 tickets each.

Figures accompanying the petition indicate that the deficit on both the city and interurban line was \$279,824 in 1926, and \$185,808 from Jan. 1 to Aug. 31, 1927. It is expected the new rates will reduce the deficit to \$209,018 or to the rate of \$.069 cents per passenger carried.

The company will also request permission to discontinue the fast freight service now offered over the interurban line between Green Bay and Kaukauna, which is being operated at a loss.

Appeal in Denver Case Refused

The United States Circuit Court of Appeals refuses to reopen the case of the city of Denver, Col., vs. the Denver Tramway, the court having ruled that the tramway has a "perpetual franchise" under the grant of 1885-1886. However, the court changes the fare stipulation, agreeing with the lower court that the company is entitled to charge a fare sufficient to net 7½ per cent upon a valuation of \$23,514,769. It is said that the city will take the case to the United States Supreme Court, despite the fact that the Supreme Court refused in January, 1927, to take jurisdiction.

Hocker Line Restoration Successful

Service on the Hocker electric line between Kansas City, Mo., and Rose Hill, Kan., will be restored, according to an agreement reached by the Kansas City Public Service Company and the Sonken-Galamba Corporation, which purchased the line for junking.

A reorganized company, known as the Kansas City, Merriam & Shawnee Electric Railway, in which ownership of the line will be vested, will be formed, and \$35,000 in bonds reissued to finance the rehabilitation. W. K. Paul, former manager of the line, will be the manager of the new concern. The Kansas Public Service Company

will subscribe to \$15,000 of the bonds, the Sonken-Galamba Corporation to \$16,000, and \$4,000 will remain in the treasury of the company. Preferred stock will be issued to patrons of the line who subscribed \$10,000. The residents of the vicinity have subscribed more than the \$10,000 quota as assigned to them, following a series of meetings in the towns to be served. The money will go to improvements. The special committee representing the citizens and railway officials are working on a plan to sell the bonds. It is said contracts will be let by March 12 and operation of the line started April 1.

The Kansas City Public Service Company will operate the cars on the line, which will serve the citizens of Kansas City, Shawnee, Kan., Merriam, Kan., South Park, and smaller rural communities. It will receive compensation of 4 cents per car-mile and 2 cents a kilowatt-hour for power. Five to 7 miles of the track will be replaced.

A freight connection with the Frisco Railroad is to be sought by the operators of the Hocker electric line. In addition to passenger service from the west limits of Rosedale to Rose Hill, a mile west of Shawnee, the reorganization will operate a freight car over the line.

Jitneys Die Hard in Detroit

More court actions and delays. Review of recent proceedings. Corporation Counsel Wilcox claims jitneys can establish feeder lines

FURTHER delay in ousting the jitneys from Detroit's main traffic arteries was won by counsel for the jitney drivers' associations when Circuit Judge Clyde I. Webster agreed to analyze the validity of the city ordinance against the jitneys. Edward N. Barnard, attorney for the jitney associations, argued that neither the Michigan Supreme Court nor the United States Supreme Court had declared the jitney ordinance valid and contended that the state court had found the measure valid only "as to the objections offered" to it in the case brought before it. Mr. Barnard further contended that the higher court had seen the ordinance was invalid in other respects than the objections brought before it.

The action was taken in a hearing on the motion of the corporation counsel to dissolve the temporary injunction issued in July by Judge Dingeman restraining the city from interfering with the operation of the jitneys. The motion was filed in December in an effort to remove the last legal barrier preventing the enforcement of the ordinance to regulate the jitneys.

The Council later voted unanimously to back Clarence E. Wilcox, corporation counsel, in his decision to carry an appeal to the Supreme Court.

In connection with this matter the corporation counsel's office won another point in the city's fight against the jitneys when the State Supreme Court on Feb. 15 issued an order requiring Judge Webster to defend his injunction of Jan. 31 which restrains the city from enforcing the jitney ordinance. The State Supreme Court granted the city's petition for leave to appeal from Judge Webster's denial of the motion by the

city to dismiss the bill of complaint filed by the jitney interests.

In their petitions the corporation counsel and his assistant pointed out that the jitneys are starting on their fifth case, the other four having been decided adversely and one having been carried to the Michigan Supreme Court and to the United States Supreme Court. The corporation counsel contends that further to prevent the public authorities from exercising their legal functions would invade the rights of the people of Detroit, contrary to the public peace, good order and well-being of the community.

The City Council declined to hear an ordinance submitted by counsel for the jitney drivers' associations, intended as a substitute for the existing regulatory ordinance which the city has been seeking to uphold. Corporation Counsel Wilcox, to whom the substitute ordinance was referred, recently advised the Council against rescinding the present ordinance and passing a substitute. Mr. Wilcox feels that the fight is virtually won, and that the Supreme Court will vacate the circuit court injunction, but that if a new ordinance were passed, its validity could be questioned and carried through the same court procedure that followed the city's attempt to enforce the original ordinance.

Under the terms of the present measure the jitneys are not barred from the streets, but the ordinance prevents them from operating on certain main arteries in direct competition with the Department of Street Railways. The Council was informed by Mr. Wilcox that the jitneys, under the present ordinance, could establish feeder routes that are needed in the outskirts of the city.

Pass Restored in Youngstown

A plan whereby patrons can ride the cars of the Youngstown Municipal Railway, Youngstown, Ohio, for a whole week for \$1.50 was put into effect on Feb. 26. No limit is placed on the number of rides, and the pass is good from midnight Saturday till midnight the following Saturday.

In order that the public might thoroughly understand the new weekly-pass plan, the company is giving full particulars through newspaper advertising which will be continued indefinitely.

The restoration of the weekly pass was decided upon when the 10-cent cash fare schedule was recently approved. This schedule calls for 10 cents on both buses and cars, a no transfer charge, six tickets for 50 cents and a weekly pass for \$1.50. The City Council recommended an eight weeks' trial of the new fares. The old rates were 8 cents cash, seven tickets for 50 cents with a 1-cent transfer charge.

City Against Sacramento Increase

City Attorney Robert L. Shinn plans to renew his attack on the application of the Pacific Gas & Electric Company to increase the fares on its railway lines in Sacramento, Cal., to 7 cents. The hearing on the proposal is now before the State Railroad Commission. The Central California Traction Company's application for a 7-cent fare on its Colonial Heights line will also be considered. This company, however, is willing to stipulate that it will accept whatever rate is fixed for the Pacific Gas & Electric Company's lines.

Peoria Council Wants Monthly Permit System Restored

The Peoria, Ill., City Council will seek reversal of the Illinois Commerce Commission order which authorizes the Illinois Power & Light Corporation to abolish its monthly permit system, by which passengers were carried on the Peoria city lines for a nickel, and establish a fare of three tokens for a quarter. The 10-cent basic fare remains. The railway was denied the right to establish a 1-cent transfer charge. City authorities claim that about 7,000 50-cent monthly cards are issued during the summer season and 8,000 in winter, with the average holder using the card twice a day 25 days a month.

Modification of Fare Order Sought

The Johnson City Traction Company, Johnson City, Tenn., has petitioned the Tennessee Railroad & Public Utilities Commission for a modification of its order of Jan. 4, 1927, allowing the company to charge a 7-cent fare instead of 5 cents on condition that the extra revenue would be used in the immedi-

ate purchase of four one-man cars, and making other improvements to equipment. The company says that two of the cars have been purchased and that other conditions of the order have been partially met, but that the company is without funds to meet its current expenses. It is asking the commission to make it optional with the company as to when additional cars shall be purchased.

President Mahon on State of Employment

Lack of work among electric railway employees throughout the country indicates a generally widespread unemployment among all classes of workers in the view of W. D. Mahon, president of the Amalgamated Association. Mr. Mahon was in Washington for a conference with American Federation of Labor officials on the subject.

The federation has just compiled data showing a sharp increase in the number of union men out of work. Unemployment of the members of trade unions averaged 13.8 per cent in the last three months of 1927. The percentage had increased during the beginning of January to 17.8 per cent and preliminary figures for February indicate an increase even above the January figures.

The percentages of figures of unemployment for those of the 23 cities not already listed are as follows, the periods given being from October to December, 1927, and the month of January, 1928:

Atlanta, 8.7, 9.7; Birmingham, 12.3, 16.6; Boston, 17.8, 19.6; Buffalo, 12.3, 26.7; Cincinnati, 12, 18.6; Cleveland, 16.6, 33.8; Denver, 19.4, 21.3; Detroit, 21, 32.3; Jersey City, 12.4, 21.6; Los Angeles, 16.2, 22.7; Milwaukee, 7.3, 9.8; Minneapolis, 8.1, 11.6; Omaha, 14.7, 26; Philadelphia, 14.3, 30.6; Pittsburgh, 15.1, 17.6; San Antonio, 4, 9; San Francisco, 11.7, 14.3; St. Louis, 9.4, 12.5; Seattle, 10, 11.3; Washington, 9.3, 13.

Mr. Mahon is reported to have said that crews in nearly every city of the country were alternating in voluntary time off, taking a full day in many cities to keep a maximum number employed. A drop in street car traffic, he said, always reflected other unemployment. He cited the recent situation in Detroit when 82 train crews were laid off as a result of the shutdown of the Ford factory.

Rapid Transit Survey Bill in St. Louis

A bill establishing a rapid transit commission for St. Louis, Mo., was presented to the Board of Aldermen on Feb. 24 by Alderman Samuel Wimer, chairman of the special aldermanic committee on rapid transit. The measure calls for an appropriation of \$25,000 for survey purposes. The commission would be composed of the Mayor, president of the Board of Public Service, a member of the Board of Aldermen, an engineer and three other citizens.

Baltimore Company Does a Real Service

A big hit has been made with an easy guide to new street names and car lines by the United Railways & Electric Company, Baltimore, Md. Recently the city authorities changed the names of approximately 900 streets, and the public has been more or less confused as a result. The guide issued by the United contains 46 pages and gives the new name of each street, its location, the section of the city, the car line nearest it and the old name. A cross index under the old name also is given.

About 20,000 of the guides were issued by the railway and are being distributed without charge. They are in great demand. The company mailed about 4,000 of the booklets to the individual members of the Baltimore Association of Commerce. As a result hundreds of letters have been received in which the company is praised for its move to help the public. A street car directory issued by the company was referred to in the JOURNAL for Feb. 11, page 254.

Sentence Served, Indianapolis Strike Organizers Leave Jail

Robert B. Armstrong and John M. Parker, who organized the strike in 1926 in Indianapolis, have been released from jail, where they served 90-day sentences for violation of a strike injunction issued by Judge Robert C. Baltzell, federal judge. They expect to be called before the United States Senate judiciary committee at its investigation of the anti-strike injunction issued by the court. The committee decided to call counsel for the Amalgamated Association together with officials of the Indianapolis Street Railway.

Would Extend Subway in Rochester

Extension of the Rochester, N. Y., subway in the bed of the abandoned Erie Canal is already being planned although the line has been in operation less than three months. The City Planning Commission has under consideration the extension of Broad Street, the overhead street now covering the subway in the center of the city from South Avenue to Oak Street. This plan would take the Park-Dewey surface trolley cars off the streets through the congested part of the city by diverting them by a ramp into the subway spur at Chestnut Street. The extension of Broad Street would necessitate razing of many large buildings in the downtown area and would involve great cost.

The subway railroad, built by the city at the cost of \$12,000,000 and operated by the New York State Railways under a three-year service-at-cost contract, has not yet been put into full operation on high-speed schedules as proposed, but patronage is exceeding the hopes of the city and railway officials.

Strike Talk Revived

Correspondence of Mayor Walker to President Hedley of Interborough Indicates Critical Situation

FRANK HEDLEY, president of the Interborough Rapid Transit Company, New York, has reiterated the stand that its contract with the Brotherhood of Interborough Rapid Transit Company Employees makes it impossible for it to employ any members of the Amalgamated or to reinstate 23 members of that union which it has discharged because of that membership.

The letter in which this attitude was rephrased was made public shortly after Patrick J. Connolly, president of the Brotherhood, had announced that that organization would strike if the men dismissed for Amalgamated membership were re-employed. Mr. Connolly's statement follows:

Nine-tenths of the 13,000 employees are loyal members of the Brotherhood and want to be left alone. We are not fighting any outside labor organization but they are apparently fighting with us. We have an agreement with the I. R. T. and we are going to insist that the Interborough live up to this agreement. We ourselves are going to live up to our agreement with the Interborough.

Our agreement with this company requires that the I. R. T. must employ only those who are members of the Brotherhood. We will not tolerate Amalgamated sympathizers in this organization.

We had a meeting this morning and were instructed to see that none of the 23 members discharged be reinstated. We have been running this road since 1916 and we are not striking or tying up any railroads or threatening or causing any trouble.

In his letter to the Mayor Mr. Hedley restated his desire to avoid a strike. It was made in reply to a request from the Mayor that a representative of the company confer with the Mayor in relation to the demand of the Amalgamated organizers that certain Interborough employees who had been expelled from their Brotherhood be restored to their jobs by the company. The request was first submitted to the general officers of the Brotherhood for their consideration. Mr. Hedley said:

The management has been informed by the officers of the Brotherhood that the Brotherhood expects the management to live up to its agreement with the Brotherhood and not to retain in its employ any men who have been expelled from the Brotherhood. The Brotherhood officers request that they have a meeting with you so that their side of the matter may be presented to you. In case you care to arrange such meeting your office will find the Brotherhood officers ready to call upon you at your convenience.

The last thing which this company desires is a strike. No matter what the outcome, it may result in bankruptcy. It certainly will greatly incommode the public even if as perfect order be maintained by the Police Department as was done during the strike of 1926. But as you were advised last summer, the management cannot operate efficiently unless its operating forces are a harmonious body of loyal men.

This company operates the safest railroad in the world. With the exception of small groups of men scattered throughout the various branches of our organization

who are affiliated with the Amalgamated Association in violation of their pledges to their Brotherhood and of their promises to the company, we have an efficient, loyal, satisfied and harmonious body of men. They constitute nine-tenths of our 13,000 employees, if not more.

They have repeatedly informed the management that they desire to be let alone by the Amalgamated members and sympathizers. Quarrels and vilification back and forth would be rife if this property were partly Amalgamated and partly Interborough Brotherhood. It must be one or the other in the interest of safe and efficient operation. Therefore the management must stand by its agreement with the great mass of loyal employees and discharge all others when so requested by the Brotherhood and decline to reinstate disloyal employees who have been expelled by their Brotherhood. By standing with more than 90 per cent of our loyal men we would seem to be able to render better service to the public and perhaps as well thereby have a better chance of avoiding bankruptcy.

Your good offices are earnestly requested to persuade the Amalgamated Association to refrain from officially calling a strike and also from taking such action as will result in a so-called outlaw strike where it will be claimed that the men got beyond their control. No body of men will go out on strike without indirect assurances of support from the Amalgamated.

Discussion of Chicago Bills Put Over

Samuel Insull, recently the target of innuendo and intimation in connection with his attempt to bring chaos out of the Chicago transportation muddle, has served notice that first he will withdraw from all effort to bring about a merger of the various properties if attacks upon him continue, and secondly, that the recent request for a higher elevated railroad fare was to render relief to the west side, declaring that whether better service is to be granted that section rests entirely with the politicians.

He covered the two points of just why he is in the railway situation, and why an increase in rapid transit fares has been asked, and summed up his answer in an emphatic and categorical denial that there ever was any "deal" between him and the politicians.

Meanwhile termination of all discussion on the local railway bills has been voted by the sub-committee of the City Council's committee on local transportation until after the primaries on April 10.

Freight Service Contracts for Rochester Subway Signed

Three steam railroads entering Rochester, N. Y., have signed contracts with the New York State Railways whereby the latter will operate freight service over the new municipally built subway railroad in the bed of the abandoned Erie Canal in the city. The latest railroad to sign is the New York Central which handles 80 per cent of Rochester's rail freight, it is estimated. The Buffalo, Rochester & Pittsburgh and the Lehigh Valley previously had signed agreements with the New York State Railways, leaving the Erie and the

Pennsylvania the only ones yet to come into the fold.

Installation of the signal system is completed and rebalasting of the road bed and straightening of curves remain to be done before the new line can install high-speed service and all interurban lines entering the city can be diverted to the subway.

Strike Averted in Memphis

Although a resolution had been approved looking toward a strike of the employees of the Memphis Street Railway, Memphis, Tenn., on March 1 a strike cancellation order was issued following the naming of W. A. Ransom, Gayoso Umber Company, as third member of the arbitration board. Mayor Overton's assistance was instrumental in deferring this drastic action. He suggested that a new contract be drawn up following the termination of the present one on March 31.

Differences between the company and the employees of the Memphis Street Railway have been widening since early last year when the men set forth their demands for an increase. Under the contract which expired on April 1, 1927, the scale per hour is: first year men, 47½ cents; second year men, 52½ cents, and third year men and older 57½ cents. The company, on the other hand, sought a reduction of 11 cents an hour. Although two arbitrators were selected, namely A. B. Galloway representing the men and F. N. Fisher representing the company, they have been deadlocked over the third.

Nashville Fetes Old-Timers

Old timers of the Nashville Railway & Light Company, Nashville, Tenn., gathered at the Chamber of Commerce Building for their annual banquet on Feb. 1. It was a meeting of the company's Twenty-Year Honor Club which numbers more than 90 men. Eight more employees were scheduled to receive their twenty-year service stripes.

Viaduct Service Resumed in Kansas City

Cars of the Kansas City Public Service Company, Kansas City, Mo., are running through the old Eighth Street tunnel and over the reconstructed elevated road making regular transportation service available again to the central industrial district, where a temporary system has existed since the abandonment of the elevated line six years ago. The resumption of elevated road service saves most of the workers from fifteen minutes to half an hour in getting to work and dispenses with transferring to reach their places of employment. Resumption of service caused the company to discontinue one line—the Minnesota-Argentine line, although it was announced that the route would be virtually duplicated by the new Indiana-Chelsea line. Rerouting was also made necessary.

Another Fare Hearing in New York on March 5

Federal Judge William Bondy has granted an extension of time to March 5 to attorneys for the city of New York and the Transit Commission to file their reply and briefs to the Interborough Rapid Transit Company in connection with the proceedings under which that company seeks to put a 7-cent fare into effect on its rapid transit lines. This was done by agreement of both sides and also because of the illness of Samuel Untermeyer of counsel for the city. This automatically extends the time of the restraining order which will prevent any increase in fare on the Interborough Rapid Transit Company's lines before March 14.

One-Man Cars Make Safety Record in Rochester

On the Rochester, N. Y., lines of the New York State Railways, January accidents in which one-man cars were involved averaged only half of the number in which two-men cars were participants, based on mileage. Leon R. Brown, safety director of the railways, so announced at a meeting at which the safety banner for January was awarded.

The State Street division won the coveted flag with a low average of one accident for every 8,729 miles traveled. This division, of which F. F. Livernash is superintendent, covers more miles than either of its competitors, the Portland and Main divisions.

The monthly competition is part of Director Brown's campaign to reduce street car accidents in Rochester to the minimum and has stimulated much interest among the employees. The meetings at which awards are made are well attended and are addressed by a prominent speaker on some phase of safety work.

Competition Keen in Salt Lake City Safety Contest

Much interest is being displayed by trainmen of the Utah Light & Traction Company, Salt Lake City, Utah, in a safety contest which is now being conducted by that company. Some time ago the seniority list was divided into three teams, which were named the Red, White and Blue teams with a captain over each. The contest runs for alternate periods of 30 days. For example, it was conducted during January, and will be resumed again during March, May, and continued in this manner. At the end of each 30-day period the winning team (the one which has the fewest accidents) is given recognition in some form of entertainment.

A simple set of rules has been placed in effect. Each accident counts one point against the team whose member was involved, the failure of a contestant to report an accident costs his team five points, while a misleading report counts five against the team involved. Each

team member wears a button signifying his membership in one of the three teams, and a great deal of intense interest has been developed among the men, with a remarkable degree of friendly rivalry.

The White team won the January contest, with a record of eighteen accidents as against twenty for the Reds and 25 for the Blues. These, of course, include minor accidents, regardless of their degree of seriousness.

It's No Longer Only a Street Car

"THEY never come back" may have its application to prizefighters and opera singers but certainly not to street cars. They are back on the streets and look better for their period of depression and neglect. Its everybody's business to see the *Nation's Business* for March, 1928, and read what Raymond Willoughby has to say about the new vision of the electric railway industry. "Right Up Front, Please!" is a complete picture of the untiring efforts at solving the operating, manufacturing and employee problems inherent in and incident to the transportation business. The writer had recourse to the analysis of the American Electric Railway Association and to the *ELECTRIC RAILWAY JOURNAL* for certain data on operating statistics.

Taxi War Hurts Seattle Trolleys

Two proposals are to be laid before the City Council of Seattle, Wash., for eliminating taxicab competition which, with its cut-rate fares, is causing losses to the Municipal Railway. One plan will provide for the operation of taxicab companies on a franchise basis. The other plan will provide for a rigid system of licensing. T. J. L. Kennedy, corporation counsel, has not given an opinion as to what legislation may be enacted. Clark R. Jackson, superintendent of public utilities, said that recent low fares by taxicab companies have cut the number of street car passengers 2,400 a day. Councilman Campbell declared that if competition between taxicab companies continues, they will be operating at rates as low as the old jitneys.

New Tariff in Chicago Suspended

A suspension until July 13 of the new passenger tariff of the Chicago Rapid Transit Company, Chicago, Ill., was ordered on Feb. 21 by the Illinois Commerce Commission. At that time attorneys for the elevated lines may appear before the commission to argue for the elimination of the three tickets for a quarter rate, the \$1.25 weekly pass and the establishment of a straight 10-cent fare.

Ambitious Transit Plan for San Fernando Valley

Plans are now being worked out by a committee called together by the combined chambers of commerce of the San Fernando Valley immediately north of Los Angeles, for the construction of a rapid transit railway line between that valley and Los Angeles. According to D. W. Pontius, vice-president of the Pacific Electric System, who spoke to a group of the leading citizens of San Fernando Valley recently, one million are headed toward California, and it is up to the leaders of the San Fernando Valley just how many will settle there. He added that only by building a railway system that would carry people to the heart of the city in fifteen or twenty minutes could a portion of that host be attracted to San Fernando Valley.

At the present time, the San Fernando Valley is served by an interurban line of the Pacific Electric Railway. It is the expectation of this group of the Chamber of Commerce that the service of the valley can be much improved by the construction of a direct line with a more frequent schedule.

G. A. Damon, prominent engineer, once affiliated with Bion J. Arnold, Chicago, said in commenting on the suggestion that the cost of the improvement be levied against property owners who would benefit most by the road:

As a matter of fact, rapid transit from outlying districts is not popular with many of the suburban communities. Hollywood has no desire for rapid transit and Pasadena is opposed to it. The doubling of land values would work a hardship on many small home owners. Car service to and from Pasadena is improving, the patronage of the Pacific Electric is increasing and I am sure that Pasadena would be unwilling to bond itself for extra service.

Among the advocates of the plan is Charles H. Kline, chairman of the rapid transit committee of the Burbank Chamber of Commerce.

Harbor Belt Line in Los Angeles Planned

A contract for the unification of about \$59,000,000 of railway facilities in Los Angeles Harbor has been completed by the Los Angeles officials, representatives of the Harbor Commission of Los Angeles and the Southern Pacific, the Union Pacific, the Atchison and the Pacific Electric Railway Companies. All these properties will participate in the development under which an independent operating unit, to be called the Harbor Belt Line, will be organized. Formal action by the city officials and railways is now awaited. The several railroads concerned in the agreement own tracks running into the harbor and the contract provides for the unification of their operation. It is expected that the Harbor belt line will facilitate the arrival and the passing of shipments to and from shipboard in the harbor.

Dinner to Brady Prize Winners

Louisville Railway entertains its employees at safety gathering. W. T. Kays gets Connelly Award

MORE than 1,000 employees and their wives attended the first all-carhouse safety dinner at noon on Feb. 20 as guests of the Louisville Railway, Louisville, Ky., in the paint shop at 29th Street and Broadway. The dinner was held to commemorate the outstanding safety record on the company's lines in 1926, which won national recognition by carrying off first honors in the Brady Safety Award Contest.

Employees of the company have a record to be proud of, many speakers declared, as they exhibited the Anthony N. Brady Medal Award from the American Museum of Safety to the Louisville Railway for the greatest achievement in safety and sanitation of any electric railway in the United States in 1926. They pointed to the average of 37,490 miles per accident during the month of January on the company's lines. They warned, however, that an even greater effort on the part of every employee is necessary to maintain the high standard that has been established.

Outstanding public service on the part of an individual employee was rewarded by the company at the dinner, when the Anthony F. Connelly Award was presented to William T. Kays, 38 years old, 2426 West Broadway, a motorman on the Oak Street car line, operating out of the 29th Street and Broadway carhouse.

James P. Barnes, president of the company, presented the award in honor of the late Anthony F. Connelly, who died three years ago after being connected with the company for more than 50 years. The award included the Anthony F. Connelly medal and \$75 in gold. Mr. Barnes also announced that Mr. Kays would be a guest of honor of the railway at the American Electric Railway Association convention in Cleveland next September.

Five other employees who received honorable mention in connection with the Connelly Award were Clint Kessler, Fourth and Avery carhouse; Fred Gollar, Shelby Street carhouse; George Bishop, 29th and Broadway carhouse; Charles A. Buren, 25th and Market carhouse, and William Schwindel, 27th and Chestnut carhouse.

Mr. Barnes said it was not believed a few years ago that all of the company's carhouses would ever be represented at the same safety dinner, because it was necessary for each carhouse to have a record of at least 25,000 car-miles per accident in a given month to be eligible for the dinners. Last month was the first month such a record has been attained, he said.

The Chestnut Street carhouse was the only one having a perfect record, as its record of 61,683 miles during January was unmarred by a single accident. The other carhouses' mileage per accident was as follows:

Highland, 67,363; Shelby, 47,523; Market, 41,341; Thirteenth and Main, 37,258; Fourth Avenue, 33,582; Seventh, 33,326; Portland, 31,228, and Broadway, 30,668.

Chartered cars brought motormen, conductors and other employees and their wives to the improvised banquet hall from all sections of the city. Music was furnished by the Louisville male high school band and numerous entertainment features were provided.

A similar meeting on the night of Feb. 20 was attended by more than 1,400 employees and their wives, who were on duty at noon and unable to attend the earlier dinner.

In commenting on the matter editorially the Louisville Times of Feb. 21 said under the caption "High Honor":

Employees of the Louisville Railway are recipients of high honor. Nothing less than good team work, every day, could get for the employees of a city railway the Anthony N. Brady Award from the American Museum of Safety.

The dinner last night commemorating

Children Ride St. Louis Cars to See Colonel Lindbergh

Approximately 60,000 school children were carried by the St. Louis Public Service Company from various points in St. Louis to the river front to see Col. Lindbergh and the Spirit of St. Louis perform on Feb. 15. Through arrangements with the St. Louis Board of Education the company provided 350 chartered cars and seven special buses to transport the children. Six buses also were put into service between Fourth Street and the levee to provide accommodations for the little ones. The children came from 99 grade and fifteen high and junior high schools scattered throughout the city.

The schedules provided for the children to reach the river front about 1:30 p.m. while 3:20 p.m. was the time set for their departure. It was necessary to reroute every line touching Broadway or Fourth Street and the



A representative group of those who serve humanity

receipt of the award, and calling attention to the January record of more than 30,000 miles per accident directs attention to the spirit and the achievement of the car men. That spirit, and that achievement, should be valued.

By the way, the record pretty flatly contradicts carpers who, here and there, complain that car operators are discourteous and disregardful of patrons. A car operator who disciplines himself in caution is not often one who is without consideration for car patrons.

Paving Plan in Toledo Awaits Franchise Passage

The Community Traction Company has written the administration at Toledo, Ohio, that it cannot go along with the big paving program unless the plan for the new franchise offered last summer is adopted. This plan would make available more than \$1,000,000 in new money and contemplates several new bus routes.

arrangement called for the turning back of certain other lines. One hundred supervisors were placed at advantageous points to direct traffic while special emergency trouble crews were placed at convenient spots in case of need. But so efficiently did the traffic department of the company operate that none of the 60,000 children was injured or lost while the chartered cars were taken out of the congested zones in time to avoid the afternoon rush.

The Board of Education paid the customary charge of \$14 per street car and \$6 an hour for the buses used. Children and their teachers and principals were provided with identification slips in the form of pasteboard street car tags.

All those wearing such tags were permitted to use the cars to return to their schools. Cars also bore signs showing the name of the school served and carried two small American flags as identifying marks.

Offices in Ohio to Move

General offices of the Suburban Light & Power Company, the Suburban Power Company and the General Light & Power Company will be moved from Cleveland to Alliance, Ohio, some time during February, according to E. W. Sweezy, president and general manager of the companies. The suburban Light & Power Company is the holding company for the other two corporations. The companies were recently purchased by New York capitalists who own the Stark Electric Railroad operating between Canton and Alliance. Mr. Sweezy was named head of the concern following the purchase.

New Safety Contest in Youngstown

Operators of Pennsylvania-Ohio Electric Company are in the midst of a new accident prevention contest with every employee of the three railway divisions outside of Youngstown, Ohio, determined to reduce the accident record to a new low level. The conditions are similar to those imposed before except that the year has been divided into four periods of three months instead of six periods of two months. The division with the highest average mileage per accident at the end of each three-months period will celebrate. The division winning the most victories at the close of the year will get a permanent trophy.

Interchange Privilege in Olneyville

An interchange of transfers between the Olneyville-Eddy Street buses and trolley cars in Olneyville has been made effective by the United Electric Railways, Providence, R. I., at the request of the Public Utilities Commission. The company had previously issued transfers only on the Eddy Street end of the bus line.

Strike Continues on Pottsville Lines

The strike on the lines of the East Penn Electric Company, Pottsville, Pa., continues with little prospects of a settlement. Meanwhile buses are being operated in the territory by the individual certificate holders. On Jan. 6 the employees walked out because they were unable to agree with the company on the inclusion of the word "subsidiary" in the new contract. The old contract expired on Dec. 31, 1927. Since the inception of the strike the so-called grievance as regards buses has been abandoned by the men. Now the company insists on certain conditions being eliminated which were in the former contract and is also insisting on the dismissal of a number of men especially objectionable to it. Members of the union appear adamant against receding from their stand that all strikers be returned.

Recent Bus Developments

Another Plan to Solve Tangle in Columbia

Another panacea for the transportation ills in Columbia, S. C., was suggested recently when the City Council adopted a resolution to the effect that bus equipment to the amount of \$25,000 or \$30,000 be purchased and leased to some responsible concern for an annual sum sufficient to repay the city in approximately three years. This company would be granted exclusive right during this period to operate bus service in Columbia and to control all forms of motor vehicle transportation charging not more than a 10-cent fare. This resolution sets forth that the city intends to hold the Broad River Power Company for whatever loss, if any, may fall upon the city from the putting into effect of such a plan.

Meanwhile, action is pending in the Supreme Court to compel the Broad River Power Company to resume railway operation. Several bus operating concerns have made definite offers to operate systems in Columbia under certain conditions, but so far none of these offers has been accepted.

The General Assembly, now in session, has under consideration a bill introduced by the Richland delegation (Columbia is in Richland County) which authorizes the City Council to control traffic on the city streets. The purpose of this bill apparently is to put the jitney out of business, as the measure provides that the Council may designate on what streets jitneys may run.

Citizens generally are becoming more and more aroused over the transportation situation and it promises to be a main issue in the election for the members of the City Council to be held in April.

Several of the suburbs of Columbia are being served by privately owned buses which make three or four trips each day. Parents of school children are demanding that something be done to enable them to get their children to school without being forced to depend entirely on uncertain jitneys. Since March, 1927, no street cars have been running in Columbia.

Muncie Case to Go Back to District Judge

The United States Circuit Court of Appeals at Chicago has reversed a recent ruling of Judge Robert C. Baltzell of the district court in Indianapolis in the suit of the Equitable Trust Company, New York, trustee, against Sumner W. Denny and other operators of independent bus lines in Muncie, Ind. Attorneys have been advised that the district judge erred in his ruling that he was without jurisdiction to try the suit in which the trust company, as trustee of a mortgage on all the property of the

Union Traction Company of Indiana, seeks to prevent the defendants from operating buses in Muncie in competition with the railway lines. The action will result in the case being referred back to the district judge for trial.

Express Bus to Cuyahoga Falls

A new express bus line to Cuyahoga Falls, Ohio, from Akron, was started on Feb. 27 by the Northern Ohio Power & Light Company. The base schedule is half-hour headway from 4:30 a.m. until 8 a.m., then one hour headway until 3 p.m., when the headway again changes to half-hour until 7 p.m., and after 7 p.m. until midnight one-hour service will be maintained. As the riding develops extra tripper service will be fit in during the rush hours when and as required. The purpose of the new operation is to serve a wider territory in Cuyahoga Falls and to relieve the heavy load situation which has developed on the present express bus line.

Houston's Suburb Enjoy Bus Service

Fifteen new Twin Coach buses were put into service on Feb. 1 by the Houston Electric Company, Houston, Tex. These buses serve Harrisburg, one of Houston's suburbs, an industrial center and residential section located on the water front. Prior to this installation of bus service one portion of this section was served by twenty jitneys while the other section was served by a car line. Operation of both the jitneys and car line was stopped with the inception of the bus service. Round-trip mileage on the line is 14.5 miles, minimum headway three minutes and the maximum headway nine minutes.

Regulatory Conference on Buses in Georgia

As soon as it can digest the information secured as to schedules, locations, rates and other features the Public Service Commission of Georgia will call the bus men together for a conference to work out details of supervision, uniform rates and so on. Already the companies must obtain permission from the commission before they can issue bonds or stocks for sale.

Some weeks ago the commission asked all operators of bus lines in Georgia to file reports giving necessary details of their business by Feb. 21. All of the companies complied with the order except the Pierce Bus Lines, Griffin, which questioned the jurisdiction of the commission. However, this company declared that it would comply with the order under protest.

Detroit Debates Jefferson Avenue Test

Percentage of passengers transferring between bus and car decreases and expenses are much higher

TWO reports on the combined bus and railway service on Jefferson Avenue, Detroit, have been submitted to the Common Council. One was from the Rapid Transit Commission. It is dated Jan. 25. The second is a combined report of the Rapid Transit Commission and the Street Railway Commission. It is dated Feb. 13. The report of the Rapid Transit Commission is accompanied by numerous charts.

SOME OF THE DETAILS

This latter report points out that the Grand River-Jefferson Avenue lines are the only ones of the system affected by the service. The former is 10.7 miles long, the latter 6.37 miles. Prior to the express experiment they were operated as one line with a combined length of 17.07 miles. A partial combined railway express and bus service was begun on the Jefferson Avenue line for a distance of 4.13 miles on Sept. 18, 1927. There were six express stops ranging from 0.52 to 1.22 miles apart. Free transfers were made to and from a local bus service at these stations for the regular fare of 6 cents. On Oct. 1 the operation of through cars at frequent intervals during the rush hours was resumed. During the last part of December the maximum distance of 1.22 miles between express stops was cut to 0.55 and 0.67 miles by the introduction of a new stop.

There was no change in speed on the Grand River line. On the Jefferson Avenue line the former speed of 13.5 m.p.h. between Woodward Avenue and the terminal at Wayburn rose to 14.8 m.p.h. On the express section alone a speed of 17.96 m.p.h. was attained. For the entire distance the passenger would save 3.24 minutes over his former travel time. At intermediate destinations he would save less, and if his journey required transfer to a local bus, he would lose a little time over the former run.

COMBINED STREET RAILWAY AND RAPID TRANSIT REPORT

During the first few weeks of the new service about 50 per cent of the bus passengers transferred to the rail, but this dropped rapidly upon the extension of the local bus service to the business district until it reached 12 per cent in December. Of the rail passengers 93.5 per cent remained on the cars. The gross revenue was fairly uniform, being in July \$189,401, November \$182,322, and December \$195,334. The expenses grew rapidly, however, so that while in July the operating ratio on the combined lines was 82.5 per cent, and in August 83.4 per cent, in October, the first full month of operation under the experiment, it was 96.5 per cent, in November 95 per cent, and in December 97.5 per cent.

The combined report to the Common Council, signed by the presidents of the

two commissions, related particularly to a suggested plan to erect a station structure in the center of the street with one or more under-passes to connect the structure with the sidewalk, the whole to be used with a combined electric railway express and local service.

The report points out that such a station would require car loading on the left hand side of the cars, instead of on the right and also a shift of the tracks to curve around the proposed station. Both of these changes would require extensive and costly alterations in existing equipment and track. Referring to the service on Jefferson Avenue the report says, in part:

Jefferson had the highest average speed of any of our street car lines before the present test, and with the express method of operation will permit speed not attainable on any other line. It is the only street that is 120 ft. wide for several miles, and it has the minimum of cross traffic. Its physical characteristics are most favorable. We should learn all we can about the cost, speed, etc., under those particularly favorable conditions before attempting to determine our future policy.

STATEMENT ABOUT RIDING HABITS

During December, 1927 (after 3½ months of operation), the riding habit on the express street car and local buses was as follows: Using street cars exclusively, 73.3 per cent; transferring from car to bus, 4.3 per cent; using local bus exclusively, 19.4 per cent; transferring from bus to car, 3.0 per cent; total, 100 per cent.

The report declares it is most important to determine whether a bus line can be operated in connection with a railway line upon a 6-cent fare. Further research is thought necessary. The test now being conducted on Jefferson Avenue should be continued for a further period. The proposed transfer station between the tracks is condemned, but a passageway, to be designed and constructed under the direction of the Department of Street Railways, is recommended at Jefferson Avenue at Chene to determine whether pedestrians would use it rather than wait for the green traffic signal and cross on the street surface.

As opposed to these reports the express system of car operation seems to have reduced delays of street traffic. Statements on this point from drivers of automobiles and motor trucks appear on page 358 of this issue.

Bus Substituted on Chattanooga Line

Discontinuance of passenger service on the Red Bank and White Oak lines of the Chattanooga Traction Company, Chattanooga, Tenn., has been authorized by the Tennessee Railroad & Public Utilities Commission. At the same time the company has been permitted to operate a passenger bus line connecting Chattanooga, White Oak and Red Bank. Transfers on the buses will be accepted on any cars of the railway system. The company must continue railway service between Valley Junction and Woodlawn, a distance of less

than a mile, Woodlawn being off any highway. Valley Junction is the point where the company's Signal Mountain and Red Bank lines divide.

Would Run Bus Line in Marlboro

The Boston, Worcester & New York Street Railway has made a request of the Marlboro, Mass., City Council for permission to operate a bus line in that city to replace railway service. Action by the City Council was held up until such time as officials explain whether their plan is to discontinue the railway line entirely.

Bill to Permit Bus Extensions in New York

Under the provision of a bill introduced in the Senate by Walter W. Westall, Republican of Westchester County, section 50-a of the public service commission law is amended by authorizing the commission to permit a street railroad or railroad corporation to operate stages, buses or motor vehicles on streets not included in, but forming route connecting with the route of such railroad, provided local consents are obtained. The matter has been referred to the public service committee.

Run South of Indianapolis to be Continued

The Indiana Public Service Commission has ordered the Interstate Public Service Company, Indianapolis, Ind., to continue for a trial period of sixty days the operation of a bus route south of Indianapolis. A loss on the route during the first 60 days of operation was reported by the company.

Replacement on Buffalo Line Under Consideration

Action has been withheld by the Town Board of Cheektowaga on the application of the Buffalo & Williams-ville Electric Railway, Buffalo, N. Y., for approval of a franchise to operate bus service through the township as part of the Williams-ville-Buffalo inter-urban line to replace the present single track electric railway along Main Street from Williams-ville to the Buffalo city line. The Town Board said it desired additional information regarding rates of fare, local stops and maintenance of road repairs.

Stage Service for California Orange Show

The Pacific Electric Railway, Los Angeles, Cal., has been granted a certificate by the California Railroad Commission to operate an auto passenger stage service between San Bernardino and the Fair Grounds of the National Orange Show during the period each year when that show is open.

Financial and Corporate

Financial Structure of Lackawanna Line Simplified

The Lackawanna & Wyoming Valley Railroad, Scranton, Pa., recently arranged with a banking group composed of Taylor, Ewart & Company, Inc., Bioren & Company, and Samuel McCreery & Company, for an issue of \$4,000,000 in bonds, the money to be used to take over from the Scranton & Wilkes-Barre Traction Company, the holding company, the bonds, mortgages, preferred and common stocks of the company and place them in control of the railroad. The Scranton & Wilkes-Barre Traction Company holds \$5,000,000 in bonds of the Lackawanna & Wyoming Valley Railroad. With the elimination of the holding company the Lackawanna & Wyoming Valley will save about \$10,000 a year in interest on bonds held by the holding company.

The \$4,000,000 is to be obtained through the sale of \$2,900,000 first mortgage bonds and of \$1,100,000 gold debentures. Upon completion of this financing, the \$2,900,000 first mortgage bonds and \$1,100,000 debentures will constitute the only funded indebtedness of the company.

The Lackawanna & Wyoming Valley Railroad (Laurel Line), operates by a third-rail double-track railroad of modern construction connecting Scranton, Pittston and Wilkes-Barre. This road, including an extension to Dunmore, is 22 miles in length and has been built entirely on private right-of-way owned by the company with one minor exception. The road is constructed in accordance with standard specifications, permitting an interchange of equipment with the Delaware, Lackawanna & Western Railroad, the Lehigh Valley and the Erie. The company owns the entire capital stock of the Lackawanna & Wyoming Valley Power Company, which generates the power used by the railroad.

Taylor, Ewart & Company, Inc., New York, are offering at 100 and accrued interest to yield 6 per cent \$1,100,000 of the twenty-year 6 per cent gold debentures dated Feb. 1, 1928, and due Feb. 1, 1948.

In addition to this offering Taylor, Ewart & Company, Inc., Bioren & Company and Samuel McCreery & Company are selling at 97 and accrued interest to yield more than 5.20 per cent \$2,900,000 of the company's 5 per cent first mortgage gold bonds. These bonds are dated July 1, 1913, and are due Aug. 1, 1951.

Stockholders Approve International Railway Changes

At a special meeting of stockholders of the International Railway, Buffalo, N. Y., on Feb. 23 the plan to provide a stronger financial structure for the

company was unanimously approved. Of the outstanding stock 96.18 per cent was represented. The plan provides for substitution of no par value common stock for the present \$100 par, and issuance of \$2,000,000 of 7 per cent cumulative preferred stock. The Public Service Commission has approved the first change, and the company will apply immediately for approval of the proposed issue of preferred stock. Proceeds from the sale of this issue will be used for the substitution of permanent financing for temporary financing, for necessary capital expenditures, and for future similar requirements.

Chicago Rapid Transit Reports

Company operating elevated lines shows slight decrease in gross and net in 1927. Traffic practically constant

OPERATING revenues of the Chicago Rapid Transit Company, Chicago, Ill., for the year 1927 were \$20,011,911 and non-operating income was \$332,840, making total gross revenues of \$20,344,751, compared with \$20,420,659 in 1926. The fares collected in 1927 averaged 8.30 cents per passenger, a slight increase over the average for the years 1925 and 1926. These facts were contained in the annual report of the company recently submitted to the stockholders.

Operating expenses (including \$323,542 set up for retirement reserve) were \$14,189,150. The taxes were \$1,767,948. Total operating expenses and taxes were \$15,957,099. This compares with \$15,797,655 for the previous year.

INCOME STATEMENT OF THE CHICAGO RAPID TRANSIT COMPANY For the Year Ended Dec. 31, 1927

Gross operating revenues:	
Passenger revenue.....	\$18,778,321
Other transportation revenues.....	1,233,589
Total.....	\$20,011,911
Operating expenses:	
Maintenance of way and structure.....	\$1,819,075
Maintenance of car equipment.....	1,567,760
Power.....	2,115,545
Conducting transportation.....	7,267,199
General and miscellaneous.....	1,419,570
Total.....	(a) 14,189,150
Net operating revenues.....	\$5,822,760
Taxes and city compensation.....	1,767,948
Operating income.....	\$4,054,812
Non-operating income.....	332,840
Gross income.....	\$4,387,652
Deductions:	
Rentals.....	\$1,074,347
Interest on mortgage debt and equipment obligations.....	2,398,332
Other interest.....	(b) 29,349
Amortization of discount.....	69,526
Total.....	3,571,556
Net income for the year 1927.....	\$816,096

Gross income was \$4,387,652, a decrease of \$235,351 from the previous year.

Interest on funded and other debt, amortization of discount and rentals of leased lines, aggregated \$3,571,556, an increase of \$66,184. The net income for the year was \$816,096, a decrease of \$301,535.

Dividends of \$464,369 were declared and paid on the company's prior preferred stock, leaving a balance of \$351,726, which was credited to the surplus account.

Corporate surplus as of Dec. 31, 1927, was \$2,917,503, compared with \$2,514,418 at the close of the previous year.

The number of revenue passengers carried during the year 1927 was 226,212,172, compared with 228,812,766 in 1926. This decrease is accounted for in part by general business conditions and considerable unemployment and in part by the fact that a number of conventions and the Eucharistic Congress brought exceptionally large groups of people into the city during the year 1926.

The traffic statistics show a steady increase for the past six years, with the exception of last year, as follows:

Year	Number of Passengers
1922.....	181,280,754
1923.....	203,953,574
1924.....	212,901,024
1925.....	216,045,575
1926.....	228,812,766
1927.....	226,212,172

Since the issuance of the last annual report, \$1,795,000 of first and refunding mortgage 6 per cent gold bonds, due July 1, 1953, were sold to reimburse the treasury for refunding and acquiring underlying lien obligations. Equipment notes and mortgage bonds paid off or acquired during the year aggregated \$1,184,000, which includes \$238,000 first mortgage 5 per cent bonds of the Northwestern Elevated Railroad purchased pursuant to the terms of the sinking fund. The funded debt outstanding in the hands of the public was increased a net amount of \$619,700 during the year. An issue of \$1,500,000, 7.2 per cent prior preferred stock, Series "B," was sold during the year at par and the proceeds were used to reimburse the company's treasury for expenditures for improvements, betterments and additions made to its properties. There were 10,932 stockholders at Dec. 31, 1927, an increase of 1,283 during the year.

Inadequate track facilities in the downtown district have for years been a serious handicap, and the efforts of the company have been steadily exerted toward increasing the efficiency of the available tracks through their more intensive use. This has been accompanied by lengthening station platforms and operating longer trains during the rush hours. The company operated 58,102,242 car-miles in 1927, compared with 57,486,898 in 1926. The company plans during the year 1928 to purchase a substantial number of new modern steel cars.

Various operating changes were made during the year to improve the service

SURPLUS ACCOUNTS

Balance, surplus Dec. 31, 1926.....	\$2,514,418
Net income for the year ended Dec. 31, 1927 (as above).....	\$816,096
Less dividends paid on prior preferred stock....	464,369
Surplus earnings for the year unappropriated.....	351,726
	\$2,866,145
Miscellaneous debits and credits (Net).....	51,357
Surplus, Dec. 31, 1927.....	\$2,917,503

Note—(a) Total operating expenses include \$323,542.56 credited to Retirement Reserve.
 Note—(b) Does not include interest accrued during the year, on Adjustment Debenture Bonds.

and new buildings were completed and placed in service. Some important structural changes were made necessary because of street-widening projects which are being carried on by the city. Total expenditures for additions, betterments and improvements were \$1,610,809 and the retirements of property were \$300,593, leaving an net addition of \$1,310,215 to the capital account for the year. During the year \$1,819,075 was expended for maintenance and renewals on the right-of-way and structures and \$1,567,760 for maintenance and renewals of car equipment.

According to the report the rates of fare now in force are insufficient to produce a fair return upon the value of the company's property. The present rate schedules have been in effect a little more than five years and their inadequacy has been thoroughly demonstrated. Although the traffic has steadily increased from 203,953,574 in 1923 to 226,212,172 in 1927, the return in 1927 was only about 3.50 per cent. The highest return for any one of the last five years was about 3.85 per cent in 1926. The board of directors has recently decided that proper steps be taken to secure increased revenues from rates, and, accordingly, the company has caused to be filed at Springfield with the Illinois Commerce Commission new rate schedules. Under these schedules all weekly passes and the three-for-a-quarter tickets will be abolished.

Under the group insurance plan for employees, \$10,399,260 of life and accident and health insurance was in effect at the end of December, 1927. A total of 5,713 men and women in the service are covered by this insurance. The insurance company paid out during the year \$107,320 for sickness and accident claims and \$146,825 for death claims, a total of \$254,145. Accident and health insurance and \$1,000 life insurance were provided at the company's expense as a result of the arbitration of the wage question in 1926.

In furtherance of the company's educational work in accident prevention, 327 demonstrations in first aid were given during the year by trained and uniformed teams of employees, before audiences aggregating 138,300 persons. These demonstrations were given in public schools, at meetings of women's clubs, business men's organizations and fraternal orders. So popular is that feature of the work that there is a

constant demand for demonstrations by the first aid teams.

Continuing the program originated in 1926 of instructing trainmen, ticket agents and platform men in correct methods of serving patrons, a total of 207 conferences of employee groups were held throughout the year. More than 2,600 employees attended those conferences and received direct personal instructions on how to answer questions and give correct information to customers. They also received instructions pertaining to neatness of dress, personal appearance, manner of speech and to showing interest in the passenger's comfort.

At the end of the year, there were 5,885 employees in service, of which number 3,541 have been with the company more than five years and 1,998 for more than ten years. The total pay-roll of the company for the year was \$10,227,783.

Portland Electric and the Northwestern to Merge

A plan by which the Portland Electric Power Company will acquire by purchase the Northwestern Electric Company, both of Portland, Ore., has been announced by Guy W. Talbot, president of the Northwestern company, and Franklin T. Griffith, president of the Portland Electric, in a statement issued over their joint signatures.

The Portland Electric Power Company owns and operates the entire railway system of Portland as well as some suburban lines.

The Northwestern Electric Company was organized in the days of the former Portland Railway, Light & Power Company, when neither Mr. Talbot nor Mr. Griffith was heading the respective organizations.

Duplicate Lines in Salt Lake to Be Discontinued

Permission to discontinue railway service and remove its tracks on sections of five lines is sought by the Utah Light & Traction Company, Salt Lake City, in an application filed on Feb. 17 with the Public Utilities Commission.

It is pointed out by the application that the lines are being operated at a loss, the gross revenue received from traffic originating on and destined to points on those lines being insufficient to pay the costs of operation and maintenance, without any allowance for depreciation or return on investment. The application also contends that deferred maintenance on those lines amounts to approximately \$344,315.

The application shows that each of the lines it seeks to remove is paralleled by other lines and proposes to construct one block of track on Third South between Ninth and Tenth East Streets, and the territory now served by the Second South line beyond Third South and Tenth East Streets will be served by cars routed over Third South from State Street to Tenth East.

Legality of Phoenix Bond Issue Upheld

The State Supreme Court of Arizona decided on Jan. 16 that there is no legal flaw in the \$750,000 issue of bonds authorized by taxpayers of Phoenix to finance a modern, efficient railway to be run under city auspices.

As soon as City Manager Rieger learned definitely the import of the court's decision, he telegraphed its substance to Gray, Emory & Vasconcelles, Denver bond dealers heading a syndicate which includes the Harris Trust Company of Chicago and others. In reply, the Denver firm wired that, on receipt of Mr. Rieger's message it had ordered the bonds printed and that the cash would be available as soon as the bonds could be signed and delivered. Since then the bonds have been publicly offered in a 4½ per cent issue at a price to yield 4.2 per cent.

W. A. Ensign has filed a taxpayers suit in the Superior Court by which it is sought to enjoin the city from paying out any money derived from sale of the street railway bonds to Claude Fisher Company under contract recently entered into to reconstruct the railway system. The ground for action is alleged want of power in the city to own or build a railway outside the city limits.

Receivership of Ohio Road to Be Lifted

Prospects are good for the reorganization of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, which has been in the hands of a receiver since its business was damaged by the 1913 flood of the Ohio Valley. Charles H. Deppe, vice-president of the Fifth-Third Union Trust Company, Cincinnati, the receiver, is slated to become president under the reorganization and Joseph L. Lackner, of the Queen City law firm of Maxwell & Ramsay, to be secretary. Samuel I. Lipp will continue as vice-president and general counsel. As a move toward lifting the receivership articles of incorporation have been filed for a successor company which will issue 7,500 shares of no par common stock, to be distributed among bondholders of the old company. The Fifth-Third Company, as trustee, recently bought the assets of the old company for the bondholders for \$205,000, subject to approval of the Common Pleas Court.

Scioto Valley Company Seeks Reimbursement

Permission to issue \$500,000 in notes for a three-year period is sought by the Scioto Valley Railway & Power Company, Columbus, Ohio, in an application filed with the Ohio Public Utilities Commission. The proceeds are to be used to reimburse the company for money spent during the past five years from income for extension and improvement of lines.

Receiver for Western Washington Properties

Upon hearing of the application of the Old Colony Trust Company, Boston, Mass., which has long been acting as trustee under the indenture securing certain bonded indebtedness of the Puget Sound Electric Railway, Tacoma, Wash., Judge Edward E. Cushman of federal court has appointed Scott Z. Henderson, Tacoma attorney, receiver for the company's properties in western Washington. Bond was fixed at \$50,000 with the understanding that if an order is entered directing the property be sold that amount will be raised.

The appointment of a receiver resulted from the filing of a complaint with the court by the Boston company

alleging that there was now due and payable to it as trustee under certain mortgages a total of \$2,552,505 and that a receiver should be appointed for protection of bondholders.

Mr. Henderson was formerly attorney for the Tacoma Railway & Power Company and Pacific Traction Company, the majority of the outstanding stock of which is owned by the Puget Sound Electric Railway, which owns the Tacoma-Seattle interurban line.

Similar action against the Tacoma Railway & Power Company was forecast at a meeting which was held in New York some few weeks ago, but it is denied by Evans & Ellis, Tacoma attorneys for the plaintiff, that the present action has anything to do with the Tacoma Railway & Power Company.

Decrease in Detroit in January

Auditor Hauser says it is believed seven year record of achievement of municipal railway is unequalled. Progress reviewed since city entered on municipal ownership program in 1921

THE balance of net income reported by the Department of Street Railways at Detroit, Mich., for January, 1928, is \$2,977 after the payment of sinking fund charges. The balance of net income for the month of January, 1927, was \$57,999, so that January, 1928, shows a decrease as compared with January, 1927, of \$55,022.

During January, 1928, 38,520,987 passengers were carried by the rail lines and 3,943,503 by the coach lines, a total of 42,464,490 passengers compared with a total of 42,313,631 carried in January, 1927, divided, 38,935,672 rail lines and 3,377,959 coach lines. In other words, the Department of Street Railways carried 150,859 or 0.36 per cent more passengers in January, 1928, than in January, 1927.

On Feb. 1, 1921, the Department of Street Railways began to function as a transportation agency, so that the general balance sheet statement at the close of business Jan. 31, 1928, may be taken as reflecting the results obtained in seven years of municipal ownership and operation. On this account W. M. Hauser, auditor, took occasion to review the seven years operation. During this time the citizens of Detroit have provided by ballot \$41,080,000 for the purchase, construction and improvement of the property. This debt has been reduced until now as of Jan. 31, 1928, it amounts to \$27,304,343. The difference between this amount and the amount provided by the people is \$13,775,656, which represents the city's equity in the property, paid entirely from revenues. Of this thirteen odd million dollars \$6,535,000 has actually been paid off and there is on hand in sinking funds \$7,240,656 to meet the requirements of the debt obligations as they fall due.

On Jan. 31, 1928, other long term debt existed to the amount of \$3,318,296, the action creating this debt having been approved by the Board of

Street Railway Commissioners and the Common Council. The debt incurred remaining unpaid at Jan. 31, 1928, was for purposes as shown below:

New Rail line extensions.....	\$882,648
125 new street cars.....	2,034,000
41 coaches.....	136,647
Property for carhouses, etc.....	265,000
Together.....	\$3,318,296

In order to provide service for the fast growing city it was necessary to finance these extensions in the manner adopted, as no bonds were available for the use of the department.

The accrued depreciation (road and equipment) at Jan. 31, 1928, as shown by the balance sheet, amounts to \$4,772,153 equal to 9.4 per cent of the \$50,549,472 of the cost of road and equipment. Mr. Hauser says that "this, it is believed, compares favorably with any city transportation system in the country."

Since the Department of Street Railways has been criticised with respect to the subject of depreciation, Mr. Hauser made the following statement to help clarify the situation:

Private corporations as a rule issue capital stock and bonds to secure money with which to acquire their property. It is not their intention to purchase back this capital stock or retire the bonds out of earnings of the property, but only to pay dividends on the capital stock and interest on the bonds, i.e., pay interest on the money received—provided such dividends and interest are earned, but that is another story. As such capital stock and bonds are never to be retired out of earnings, some way must be devised to replace the property when it is worn out. Accordingly, an account is opened up called "accrued depreciation" to which annual installments are transferred from earnings in an amount sufficient to equal the cost of the property by the end of the period of years that it is estimated it will last in operating condition. For purposes of discussion, it is immaterial whether such an ideal condition is exactly realized or not.

Municipal corporations do not issue cap-

ital stock but they issue bonds instead. Probably the law provides no other way for them to finance the construction or purchase of their public utility properties. It is the intention where such bonds are issued to redeem them at maturity, i.e., to buy them back. Accordingly, a fund is set up called a "sinking fund" to which annual installments are transferred from earnings in an amount sufficient to equal the cost of the property by the end of the period of years that it is estimated the property will last in operating condition. Some cities have not been careful about the length of the term of their bonds, but in all cases the term of the bonds issued should coincide with the life of the property purchased by such bonds, or having a less life, so that the transaction may be conservative. It is apparent therefore that at the time when the property is worn out the bonds will be paid and the city will have neither property nor debt. Should the citizens wish to continue the property in the future, property can be bought with a new issue of bonds to be paid as before.

In conclusion Mr. Hauser says that failure to distinguish between private finance and public finance has led many to make statements that becloud the issue. According to him it is impossible to pay for two plants at the same time and that is, in effect, what is being done when depreciation and sinking funds are both established. He says:

This is practically impossible and would not be right if it were possible. It is impossible first because to pay for one plant and to lay aside funds to purchase another would call for an excessive rate of fare, and for the present generation to provide for future properties to be used by the following generation is wrong in principle because it is making one generation pay for the next generation's needs. Notwithstanding this, however, the Department of Street Railways with its existing rate of fare has been enabled, in addition to paying off \$13,775,656 of debt, to set up accrued depreciation in the amount of \$4,772,153. The amount represented by this accrued depreciation has been earned and has been invested in property, a proper procedure. Not one cent of any of this money has been contributed by the taxpayer. It has all come from the car riders.

In other words, as Mr. Hauser puts it, the Department of Street Railways, during the period from Feb. 1, 1921, to Jan. 31, 1928, the past seven years, has:

1. Paid all operating and maintenance expenses, including paving between tracks.
2. Taxes on the physical property of the entire street car system, the same as if privately owned.
3. All interest charges on the debt outstanding against the property.
4. All sinking fund requirements as required by the City Charter.

Nebraska Company Retired from Railway Field

The Nebraska Railway Commission has authorized the Bethany Traction Company, a subsidiary of the Lincoln Traction Company, to remove all of its trackage from 49th and Holdrege Streets to a point on Hiram Street, Bethany. This will end the corporate life of the company, as it is without ownership of any property now. The suburb of Bethany is served by buses operated by the Lincoln company elsewhere in the city.

Changes in Capital Structure of Nova Scotia Company

The Nova Scotia Tramways & Power Company, Halifax, N. S., is to change its name to the Nova Scotia Light & Power Company and to effect a capital reconstruction which will affect all the present outstanding security issues and place the company in a financial position with capitalization more in line with earning power.

A total of \$3,682,500 in first mortgage and in general mortgage bonds is now outstanding. Both these issues will be called and will be replaced by a new 5 per cent first mortgage issue. The redemption of the present issues will involve an annual saving in fixed charges, for the general mortgage bonds now bear interest at 7 per cent. Ranking junior to the bonds, the new company will create an issue of 25,000 new 6 per cent cumulative preference shares of \$100 par value. Doubtless, some of this stock will be sold to keep the company in a sound working capital position. The new company will have 40,000 common shares of no par value, of which 2,510 will be issued to the holders of the present common shares on the basis of one new share for every ten shares of the present stock. In addition to this, 32,013 shares will be issued to the holders of the present preferred shares of the company on the basis of 1.54 new shares for each preference share. In this fashion, the company will liquidate its arrears of preferred dividends.

As soon as the shareholders of the company have authorized the change in the name of the company and the capital reconstruction, a bill to carry out the plan will be introduced at the present session of the Nova Scotia Legislature. The Nova Scotia Tramways bonds will not be redeemed until June 1 at the earliest.

The company has just experienced the best year in its history. For the year just concluded, the company's deficit account was reduced from \$204,023 to \$174,476. The results of operations over the past three years follow:

	1927	1926	1925
Gross.....	\$1,491,608	\$1,438,903	\$1,344,099
Operating expenses.....	933,902	1,003,765	959,371
Net.....	\$557,706	\$435,138	\$384,728
Interest.....	214,976	216,214	216,926
Taxes.....	120,355	16,520	16,526
For reserves, etc....	\$222,375	\$202,404	\$151,276

Milford-Uxbridge Property Sold

The Supreme Court has authorized Walter Adams, receiver of the Milford-Uxbridge Street Railway, Milford, Mass., to sell the property to the Citron-Beyer Company, Trenton, N. J., for \$86,200.

Bids for the property, which was ordered sold at public auction on Feb. 24, were opened by Judge Wait. The only other bid was made by a New York company. It was for \$83,625. After the bids had been opened and read the New York people raised their bid to

\$86,500. This figure was not considered.

Judge Wait said that the sale had been ordered for the best interests of the people of Milford and Uxbridge, and for the railway itself. It was stated after the sale that the new owners would replace the railway with buses.

The railway was organized 32 years ago as the Milford, Holliston & Framingham Street Railway. Since 1902 the name Milford & Uxbridge Street Railway has been used. The Milford & Uxbridge Company has operated cars from Milford to Framingham through Holliston; from Milford to Uxbridge, through Mendon and Hopedale; from Milford to Medway and from Milford to North Grafton by way of Hopedale, Upton, West Upton and Grafton.

The company operates its cars over the latter line over the rails of the Grafton & Upton Railroad, electrified between Hopedale and North Grafton, the railroad company owning the poles, roadbed and other equipment. Until a year ago the Milford & Uxbridge Company also operated between Milford and Hopkinton. This service was discontinued owing to lack of patronage.

Hartford-Springfield Route Sold

The New England Transportation Company has purchased the Hartford-Springfield Coach Company for a price reported to be \$250,000 with the purchaser to assume all the outstanding obligations of the Hartford-Springfield line. The line was purchased to perfect the interstate operation of the New England system. The coach company operates between Hartford, Conn., and Springfield, Mass., over the route of the old Hartford & Springfield Street Railway, of which it is the successor.

Seattle Meets Its Purchase Payment

As a result of financial aid from the light department, city officials of Seattle, Wash., were enabled to telegraph to the city's fiscal agent in New York the annual payment due on March 1 on the Municipal Railway purchase bonds. The sum, \$1,252,510, included \$833,000 on the principal and \$250,050 in semi-annual interest. The rest of the amount transmitted will go toward retiring other bonds and meeting interests. This leaves \$6,161,000 yet to be paid on the \$15,000,000 purchase price agreed upon when the city bought the railway system from the Puget Sound Power & Light Company.

The difficulties encountered in meeting this year's payment were side-stepped, temporarily, at least, when the City Council negotiated a loan of \$550,000 from the light department to the railway department to enable the railway to meet its payroll and other operation costs while all the revenues were put aside to make up the March 1 installment. The railway is paying 4 per cent interest on the loan. Of a similar loan made last year, \$100,000 remains to be repaid.

Dividend on Denver Preferred Cut

The Denver Tramway, Denver, Col., has declared a dividend of 75 cents a share on the preferred stock, payable on April 1 to stockholders of record March 15. This stock is cumulative at the rate of \$1.25 a share quarterly. Since the company paid only 75 cents for the two last quarters it is now \$1 in arrears on the issue.

Testimony Concluded in St. Louis

Taking of testimony on the valuation of the St. Louis Public Service Company, St. Louis, Mo., was concluded by the Missouri Public Service Commission on Feb. 18. The final witness was M. H. Doyle, chief engineer of C. E. Smith Engineering Company, consulting engineers for the city of St. Louis. His set-up of the investment cost of the railway as of Jan. 1, 1927, used in operation was \$47,375,948, to which he added \$2,091,833 of non-operating property, giving a total investment of \$49,467,781.

The company at former hearings on its application produced evidence to show a reproduction valuation of \$100,000,000 and contended for a rate-base valuation of \$75,000,000. The temporary value fixed by the commission was \$52,000,000.

Net Earnings of Stark Electric Doubled

By manufacturing power part of the year, and cutting costs by the more extensive and intensive use of one-man cars, the Stark Electric Railroad, Alliance, Ohio, shows a net income for 1927 of \$113,402 compared with \$53,309 for 1926. This is in face of a \$1,600 reduction in gross income.

Where in the past the power bill was approximately \$180,000, the Stark Electric estimates the 1927 cost at \$100,000. The company's plant was operated during most of the year.

Statistics covering the railroad, with the Alliance Power Company, a subsidiary, follow:

	1927	1926
Gross earnings.....	\$459,238	\$460,865
Operating expenses and taxes...	345,836	407,826
Net income.....	\$113,402	\$53,039

Interborough Balance \$1,401,578

For the seven-month period ended Jan. 31, 1928, the gross revenue from all sources of the Interborough Rapid Transit Company, New York, N. Y., was \$38,656,001 representing an increase of \$2,845,816 over a similar period of the previous year. Total operating and maintaining expenditures were \$22,592,337 an increase of \$1,108,236. The balance after interest and rentals and which is subject to Transit Commission readjustment was \$1,401,578 or an increase of \$1,656,493 for the seven months' period ended Jan. 31, 1927.

Legal Notes

FLORIDA.—*A "Jitney Bus" Is a Common Carrier and Therefore Subject to Appropriate Governmental Regulation.*

The ordinary use of the city streets by a citizen in travel and the prosecution of his business is an inherent right which cannot be taken away by the city and may be controlled only by reasonable regulation. But the right to use the streets for conducting thereon a private business is not inherent or vested. It can be acquired only by permission or license from the city. Where a state had delegated to a city power to license and regulate traffic on its streets, a city ordinance prohibiting the grant of permits for operation of motor buses in congested districts is a valid exercise of the city's police power. [State vs. Quigg, 114 So., 859.]

LOUISIANA — *Municipality Operating Railroad Does So on the Same Basis as Railway Corporation.*

The municipality of Monroe, La., which operates a street railway, passed an ordinance requiring a steam railroad passing through the city to construct over its track certain overhead crossings to be used by the municipal street railway. It was held that the municipal railway was a private undertaking operated for private gain and the position of the city in this case was like that of a private corporation engaged in the same business, and not of a governmental agency. Hence, its ordinance was invalid and it must pay for the construction of the crossings used at its own expense. [Vicksburg S.&P. Railway vs. City of Monroe, 115 So., 136.]

MASSACHUSETTS—*Responsibility of Subway Company for Maintenance of Station Approach.*

A subway passenger fell over a block on the sidewalk surrounding a subway station. The block was 18 in. high and once had been the base of a traffic sign belonging to the city of Boston. It had been in the same location for at least five months. In the lease of the subway from the city to the operating company, the latter agreed to keep in good condition the "entrances, approaches, stations, etc." of the subway and was held responsible for the accident. [Smith vs. Boston E.R. Co., 159 N.E., 501.]

MINNESOTA.—*Status of Fireman Riding to Fire on Fire Truck.*

A fireman riding to a fire on a fire truck was injured in a collision with a street car. Negligence was charged against both the motorman and the truck driver. The court held that the fireman injured was not engaged in a "joint enterprise" with the truck driver. To constitute "joint enterprise" two or more

persons must unite in joint prosecution of a common purpose under such circumstances that each has authority, expressed or implied, to act for all in respect to the conduct or the means or agencies employed to execute such common purpose. [Ring vs. Minneapolis S.R. Co., 217 N.W., 130.]

MISSOURI—*When Passenger Status Begins at a Stopping Point.*

Where a person, following directly behind others who had boarded a bus with the knowledge and assistance of the conductor, had set his foot upon the rear platform with the intention of securing passage therein, he became a "passenger," irrespective of where the regular or customary stopping place for the bus may have been. [Hayward vs. Peoples Motor Bus Co. of St. Louis, 1 S.W. (2d), 254.]

NEW HAMPSHIRE—*Settlement with One of Two Defendants in Claim in Negligence Case.*

A suit for damages was brought against both an automobile driver and street railway alleging negligence, but settlement was made by the automobile driver before the trial. It was held this did not prejudice the claim of the plaintiff against the railway company, though the sum received from the driver should be deducted from the amount of judgment against the railway company. [Masterson vs. Berlin Street Railway, 139 A., 753.]

NEW JERSEY—*Requirements for Franchise Grant Must Be Fulfilled.*

The general ordinances of a city provided that before licenses for motor buses should be granted, applicants must give certain information in writing and then that the application should be acted upon within 30 days. As these requirements were not fulfilled, the court declared that a license granted by the city to a motor bus company was invalid. [P.S. Ry., vs. Hackensack I.C., et al., 139 A., 797.]

NEW JERSEY—*Bus Operating Without Authority Is Not Released From Franchise Tax.*

A state act provides that motor buses operating in or through municipalities of the state shall pay 5 per cent of their receipts monthly to the various municipalities, in proportion to the length of route in each. A bus company which had been operating for a long time in the town of Guttenberg without a permit declined to pay this tax because the town had not officially granted its consent to operation. But as the town had not objected to the operation of the bus, the court held the tax must be paid. [Guttenberg vs. Benjamin, 139A, 823.]

OHIO—*Liability for Baggage of Bus Passenger.*

A bus passenger attempted to take a hand bag into the vehicle, but an official of the bus company insisted upon taking charge of it, stating that it would be returned to the passenger at the end of the trip. It contained among other things a lady's wrist watch and clothing intended for presents to the passenger's family. At the end of the trip the bag could not be found. The court held that the urgency of the agent of the carrier to take the baggage made the circumstances differ from those where baggage is carried on a check system at the request of the passenger, and that he could collect within reasonable limits both for his own clothing and for articles intended for members of his family, like those specified. A judgment for \$116.25 was upheld. [Cleveland-Akron Bus Co. vs. Rogoff, 159 N.E., 374.]

TENNESSEE—*Mother Not Entitled to Recover from Fright and Shock when Minor Son Is Injured.*

A mother witnessed an accident in which her minor son was seriously injured by a street car. It was held she could not recover for injuries resulting to herself from fright and shock at such a time. [Nuckles vs. Tennessee Electric Power Co., 209 S.W., 775.]

TEXAS—*Seat Fee For Buses Upheld.*

The Court of Civil Appeals of Texas upheld Article 820 of the Penal Code, which provides that owners of passenger motor vehicles operating for hire, in addition to the regular license fee, based on the horsepower and weight of the vehicle, must pay an additional registration fee of \$4 a year for each passenger such a vehicle will seat. [Lowery vs. English et al., 299 S.W., 478.]

WASHINGTON — *Special Precautions Should Be Used When Operating Contrary to Direction of Traffic.*

A railway company had tracks on both sides of the street, but used only one for both directions of operation. In a case of this kind, a car motorman should exercise especial precaution when operating contrary to the traffic on his side of the street, as a stranger might assume that cars on tracks on the right-hand side of the road would be proceeding in the same direction as himself. [Kitchen vs. Tacoma R.&P. Co., 262 P., 961.]

WISCONSIN—*Precautions Necessary in Inspection of Tires.*

While a bus was traveling at the rate of 4 to 5 m.p.h., a tire blew out with such force that it punctured the housing and caused injury to a passenger sitting above the wheel. Prior to starting a representative of a tire company had inspected the tires in the manner regularly followed, namely, by feeling them from the outside. The bus company was held to have exercised ordinary care, absolving it from negligence in the injury to the passenger. [Ormond vs. Wisconsin P. & L. Co., 216 N.W., 489.]

Personal Items

F. A. Healy Honored

F. A. Healy, auditor and treasurer of the Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, was elected president of the Central Electric Railway Accountants' Association, at the recent meeting in Cincinnati. Mr. Healy has been in electric railway work since 1906 and was instrumental in developing the Ohio Electric Railway at Springfield into one of the most extensive interurban systems in the Middle West. With the segregation of the Ohio Electric System properties in 1921, Mr. Healy became secretary-treasurer of the Indiana, Columbus & Eastern Traction Company as well as its leased lines, and for a few months following the retirement of J. H. McClure as active receiver, he took over the work of general manager in addition to his other duties.

At the age of nineteen Mr. Healy was working in the office of the Atchison, Topeka & Santa Fé Railroad. From then he served many steam railroad properties including the Southern California Railway, the Santa Fé, Prescott & Phoenix Railway, the South Carolina & Georgia Railroad, the Augusta Southern Railway, the Ohio River & Charleston Railroad and the Lake Champlain & Ogdensburg Railroad, the Atlanta & West Point Railroad and the Western Railway of Alabama. From the steam railroad field Mr. Healy then went into electric railroading. He helped to form the Central Electric Railway Accountants Association in 1907 when systematic electric railway accounting was in its infancy. Mr. Healy was born in 1861 at Moline, Ill.

W. O. Wood With Cable Company

William O. Wood, well known in the public utility field and particularly for his work with the New York & Queens County Railway, was recently elected vice-president of the Waterbury Cable Service, Inc., of New York and Chicago.

For many years Mr. Wood was identified with railroads and electric railways in New York, the Middle West and the South. Following his service with the Louisville and Nashville and the Illinois Central Railroad he entered the electric railway field as general superintendent of the Rapid Railway System, comprising the interurban lines of the Detroit United Railway, Detroit, Mich. Subsequently he was superintendent of the rapid transit lines in Brooklyn and later assistant general superintendent with charge of transportation in Brooklyn. For one year he was operating statistician of the Interborough-Metropolitan Company, New York.

Mr. Wood's most recent electric railway connection was as president and general manager of the New York &

Queens County Railway and vice-president and general manager of the New York & Long Island Traction Company and Long Island Electric Railway. These activities covered a period of fifteen years. His headquarters will be at 342 Madison Avenue, New York.

Wadsworth Winslow Advanced with Hemphill & Wells

Although less than three years have passed since Wadsworth Winslow became affiliated with the Interstate Street Railway at Attleboro, Mass., he has ably demonstrated his ability to take over the position of general manager. This appointment became effective on March 1. Mr. Winslow served as as-



Wadsworth Winslow

sistant treasurer and secretary of this Hemphill & Wells property from Oct. 1, 1925, to Nov. 1, 1926, when he became assistant general manager.

His early experiences were varied and valuable. For eighteen years he was employed by Stone & Webster covering the period from 1907 to 1925. With the Blue Hill Street Railway of Canton, Mass., he received his training in practical railway work, including accounting, car shop practice and service as conductor and motorman. He was engaged in these capacities at Canton for about two years. From this work he went to the Chase-Shawmut Company, electrical supplies manufacturers at Newburyport, Mass., as accountant. His next connection, covering three years, was with the Cell Drier Machine Company, Taunton, Mass., as assistant treasurer. Later he became auditor of the Chicago, Wilmington & Franklin Coal Company, Chicago. All these properties were under Stone & Webster management, which he left in 1925 to join Hemphill & Wells in New York.

Mr. Winslow was born in Quincy, Mass., on Sept. 2, 1888. He was educated in the Quincy grammar school and at the Canton high school. His education also included special courses in accounting in the Walton School of Commerce, Chicago.

J. D. Alexander and Guy McDougal Advanced in Fairmont

John D. Alexander, for the last seven years purchasing agent of the Monongahela West Penn Public Service Company, Fairmont, W. Va., became manager of transportation on March 1, succeeding R. W. Spofford, who resigned on Jan. 1.

Mr. Alexander has had considerable construction and mining engineering experience. He went to West Virginia first in 1916 with the Sanderson & Porter organization in charge of the reflooring and reconstruction of the Marietta-Williamstown bridge. Later he was the engineer in charge of construction of the Monongahela system power house at Parkersburg and engineer on the construction of the Boaz Bridge between Parkersburg and Williamstown. While working as engineer on the construction of the big power plant at Rivesville, he resigned to join the army and spent ten months overseas in a machine gun battalion.

Following the war he returned to the Rivesville plant with Sanderson & Porter until the construction work there was completed and then he spent some time in Oklahoma as superintendent of pipe line construction. Later he was employed by the Monongahela West Penn Public Service Company to supervise the construction of the additional unit to the Rivesville plant and since that time has been head of the purchasing department.

Mr. Alexander is a native of Alabama and a graduate of the Alabama Polytechnic Institute. He is one of five Alexanders in the employ of the local company, who are, so far as known, not related.

Guy McDougal, who for a number of years has been assistant manager of the purchasing department, becomes acting manager.

H. H. Cloyd and D. B. Eyer Promoted at Kansas City

Hardy H. Cloyd has been appointed analysis engineer reporting to the controller of the Kansas City Public Service Company, Kansas City, Mo. Donald B. Eyer will have charge of the work in vice-president Buffie's office formerly handled by Mr. Cloyd.

Mr. Cloyd entered utility service in Kansas City in March, 1917, as statistical clerk at the Missouri River power station. Later he was transferred as assistant superintendent of power and equipment. In 1924 he moved to the general office as assistant to the general manager, which title was later changed to assistant to vice-president in charge of operations.

Mr. Eyer went to Kansas City from the General Electric Company in 1924 as electrolysis engineer. He was later made electrical engineer in the office of the general superintendent of maintenance. He was graduated from Kansas University.

Manufactures and the Markets

\$787,300 for Railway Work in Atlanta

The 1928 budget for the railway department of the Georgia Power Company, Atlanta, Ga., calls for \$787,300. This budget does not contemplate any new cars for this year. Of the total \$360,000 is for miscellaneous track improvements, \$150,000 for new special work and track to enable the company to use the two new viaducts at Central Avenue and Pryor Street now being constructed by the city, \$40,000 for miscellaneous improvements, buildings, grounds, etc.

The mechanical department gets \$237,300 as a total amount. Of this, \$121,000 is for equipment trust payments, \$74,192 for remodeling and miscellaneous improvements to cars, and \$44,110 for miscellaneous tools and improvements to car shops and carhouses.

The mechanical department expects to change over 40 two-man cars for one-man operation during this year. The cost of changing over twenty of the cars is included in the 1928 budget, and the cost of changing the other twenty is a carry over item from the 1927 budget.

Case Involving Patents Referred Back to Lower Court

A decision by the United States Circuit Court of Appeals has been made in reviewing the findings of the U. S. District Court in the case of Goldschmit Thermit Company vs. Alumino-Thermic Corporation, Hugh G. Spilsbury and Henry J. Barnes. The review of the findings of the lower court was made on appeal by the Alumino-Thermic Corporation.

The Appellate Court modified the decision of the lower court to the extent of finding that Goldschmit patent No. 900366 covering preheating, which expired during the litigation in this case, was invalid. The court found the so-called insert patent of the Goldschmit company valid and infringed. It stated further that the method of undercutting rails for welding is not an infringement of this patent. Goldschmit Patent No. 1075709 covering the manufacture of ferroso-ferric oxide and its use in the manufacture of alumino-thermic mixtures was held valid and infringed.

The case has been referred back to the lower court for modification of its decree.

Stone & Webster, Inc., Open Office in Paris

Stone & Webster, Inc., Boston, Mass., announces the opening of a Paris office at 2 Rue des Italiens. The firm has reported on many large foreign projects recently financed, including the Adriatic Electric Company, the

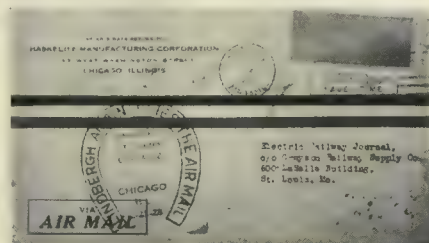
Lombard Electric Company and the Italian Public Utility Credit Institute.

Through the Paris office, investigations, valuations and reports on public utilities, industrial plants and government and municipal loan projects will be handled for bankers and investors.

James F. Case will be in charge of the new office.

Haskelite Sends Lindbergh Air Mail Letters

An air mail letter carried by Lindbergh was the history-making treat sent by the Haskelite Manufacturing Corporation to all of its customers and prospects in St. Louis, Mo., on Feb. 21 when the colonel operated the Chicago-St. Louis air mail line.



To Electric Railway Journal via Lindbergh air mail

As a letter could not be sent direct to ELECTRIC RAILWAY JOURNAL in New York, the Haskelite Corporation sent a copy to its railway representative in St. Louis, as illustrated, which was forwarded to New York.

The letter carried a special head and was printed on a light grade of paper permitting it to come under the 10-cent half-ounce rate. The contents of the letter boosted the use of air mail and advised that the plywood used in the "Spirit of St. Louis" is Haskelite.

Some Recent Twin Coach Deliveries

Twin Coach Corporation, Kent, Ohio, reports delivery of twin coaches in January to the following electric railway properties:

Virginia Electric Power Company, Norfolk, Va., ten mechanical drive urban type; Northern Ohio Power & Light Company, Akron, Ohio, one mechanical drive parlor coach; Pacific Electric Railway, Los Angeles, Cal., one urban type; Los Angeles Railway, Los Angeles, Cal., one urban type; Portland Electric Power Company, Portland, Ore., two mechanical drive urban coaches. Eight twin coaches with electrical equipment for operation as trackless trolleys were shipped to the Manila Electric Company, Manila, P. I. One of these coaches was completely assembled while the other seven were shipped "knocked down."

Expense of New Truck and Taxi Lines Affect Yellow's Earnings

If extraordinary charges of \$561,604 are eliminated, operations of Yellow Truck & Coach Manufacturing Company, Chicago, for 1927 show a slight profit. Militating against the company financially was the expense incidental to bringing out new lines of trucks and taxis. According to the report, the year 1927 was one primarily of readjustment. The company hopes, however, to realize shortly many economies as a result of the concentration of operations in a modern plant and should also benefit by the improvements in and additions to its line of products.

Paul W. Seiler, president of the company, speaking of the 1927 operations, said:

Poor showing in 1927 resulted primarily from losses of an extraordinary character as well as additional expense incidental to bringing out complete new lines of trucks and taxicabs. Eliminating these extraordinary charges, operations for the year would have shown a slight profit. It has become more and more apparent that reconstruction of the manufacturing property was essential. Recently, it has been made manifest that severe writeoffs of asset values were necessary in connection with the obsolescence of products no longer in current production, developing the new line of products and compensating manufacturing operations in a new plant at Pontiac, Mich. Further losses have been suffered in respect to accounts receivable. Writeoffs established in 1927 on account of the above have amounted to \$5,641,605.

Total surplus of the company at the beginning of the year stood at \$8,073,770. As of Dec. 31, 1927, surplus has been reduced to \$165,078. In view of the small available surplus and probable further operating losses during the early months of 1928 there appeared no alternative but to suspend dividend distribution until the operation condition of the company becomes more assured.

The report shows net loss of \$6,858,691 after expenses, depreciation, and special adjustment charges of \$5,641,604. This compares with net income after expenses, depreciation and federal taxes, of \$1,125,922, equal to \$7.50 a share on \$15,000,000 7 per cent preferred stock in 1926. After payment of preferred dividends amounting to \$1,050,000 the total deficit for 1927 was \$7,908,691 compared with a deficit of \$627,578 in 1926 after dividends on the preferred and common B shares.

A statement was issued which in part follows:

The circumstances surrounding the present situation of Yellow Truck & Coach seem to indicate that holders of its preferred stock will be deprived of income thereon for a period of time impossible to predetermine. Feeling that this preferred stock is amply secured as to its ultimate position and recognizing the probability that some of the present holders purchased the preferred stock by reason of General Motors Corporation's investment in the company, General Motors Corporation has authorized for submission to all of the said holders the following offer: For each share of 7 per cent cumulative preferred stock of Yellow Truck General Motors Corporation will pay \$93 in cash. This offer expires at the close of business May 10, 1928.

General Motors Corporation does not recommend either the acceptance or the rejection of the foregoing offer.

General Motors purchased its interest in Yellow Truck as an investment. It in no way guarantees the earnings or securities of Yellow Truck & Coach Manufacturing Company.

At the meeting of directors John D. Hertz resigned as chairman of the board of the Yellow Truck & Coach. John A. Ritchie resigned as vice-chairman and was elected chairman.

Spring Meeting of the Policies Division N.E.M.A.

Adoption of definite recommendations on problems of business policies and merchandising principles will feature the Spring Meeting of the Policies Division, National Electrical Manufacturers Association, March 14-16, Edgewater Beach Hotel, Chicago, Ill.

Action by the division will be requested on the matter of an All-Electrical Industry Show, on tariff matters, and on adequate statistics. A request for definite support of the program of the Electrical Industry Sales Conference will also be presented.

More A.C.F. Coaches for Norway

The American Car & Foundry Company, New York, has recently made another shipment of chassis for motor coaches, to the city of Oslo, Norway. Up to date 39 A.C.F. motor coaches have been purchased for this Norwegian service.

These coaches are powered by the $3\frac{3}{4} \times 5$ in., six cylinder Hall-Scott engine, and have a 198 in. wheelbase. The bodies, built and mounted locally, are similar in design to the modern American coach.

Use of Treadles Grows

An increase of 66 per cent in the use of National Pneumatic Company automatic treadle exit doors in one year is emphasized in a card folder issued by that company. According to the figures given it is stated that 42 cities were operating 1,696 cars and 138 buses equipped with one or more treadle doors a year ago. During 1927 these figures were increased to 64 cities operating 2,829 cars and 216 buses equipped with one or more treadle doors, making a total of over 5,000 doors. A list of the cities in which these cars are operated shows wide geographical distribution of treadle applications.

Last Knoxville Cars to Be Delivered

The last of twelve new cars ordered in 1927 by the Knoxville Power & Light Company, Knoxville, Tenn., are to be delivered in the next ten days. Specifications of these cars, purchased from the Cincinnati Car Company, Winton Place, Ohio, were published in the issues of Dec. 10 and Feb. 25.

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

Metals—New York		Feb. 28, 1928
Copper, electrolytic, cents per lb.	13.70	
Copper wire, cents per lb.	16.125	
Lead, cents per lb.	6.05	
Zinc, cents per lb.	5.8125	
Tin, Straits, cents per lb.	51.625	
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	.....
Somerset mine run, Boston, net tons	.....
Pittsburgh mine run, Pittsburgh, net tons	.....
Franklin, Ill., screenings, Chicago, net tons	1.825	
Central, Ill., screenings, Chicago, net tons	1.675	
Kansas screenings, Kansas City, net tons	2.125	
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	5.30	
Weatherproof wire base, N. Y., cents per lb.	16.50	
Cement, Chicago net prices, without bags	2.05	
Linseed oil (5-bbl. lots), N. Y., cents per lb.	10.2	
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.25	
Turpentine (bbl. lots), N. Y., per gal.	\$0.6450	

ROLLING STOCK

SEATTLE MUNICIPAL STREET RAILWAY, Seattle, Wash., needs additional passenger buses to take care of the increasing population in Seattle's outlying districts, according to a letter recently sent by D. W. Henderson, superintendent of the street railway department, to O. T. Erickson, chairman of the City Council utilities committee. He recommended the immediate purchase of ten new buses for distribution on the nine bus lines operated by the railway department.

DETROIT MUNICIPAL RAILWAY, Detroit, Mich., has not yet made the awards under its recent call for bids for buses. The American Car & Foundry Company is reported as the low bidder on inquiry for 25 to 100 new motor coaches, bidding \$12,962, on gas-electric 40-passenger bus, \$11,265 for gas-electric 30-passenger, \$10,962 for gas-mechanical 40-passenger and \$9,265 for gas-mechanical 30-passenger bus.

TRACK AND LINE

KULP THEFT PROOF LAMP COMPANY, Chicago, Ill., recently announced that through a contract signed between that company and the General Electric Company, the General Electric Company was to begin immediately to manufacture and bill quantities of Kulp light bulbs.

WASHINGTON RAILWAY & ELECTRIC COMPANY, Washington, D. C., has been ordered by the Public Utilities Commission to remove its center trolley poles in Wisconsin Avenue from River Road to the District line and substitute side-pole span-wire construction. The work will not be started, however, until the projected widening of Wisconsin Avenue takes place this year.

TRADE NOTES

WAUGH EQUIPMENT COMPANY, manufacturer of Waugh draft gears, has moved its offices formerly located at 1 Pershing Square, New York, to the

new Graybar Building, 420 Lexington Avenue.

BLACK & DECKER MANUFACTURING COMPANY, Towson Heights, Baltimore, Md., has appointed R. C. Bastress, formerly with the Fort Wayne Iron Store Company, to handle Indiana and part of Michigan. L. W. Beuhausen, formerly with Slocum & Kilburn, has been employed to handle Western Massachusetts and G. N. McCarthy will be the representative in Buffalo territory, taking the place of H. B. Austin, who has been transferred to the Chicago district.

MARTINDALE ELECTRIC COMPANY, 1248 W. Fourth Street, Cleveland, Ohio, manufacturer, manufacturers' agent and importer of Martindale motor maintenance equipment products, has recently opened a branch in New York City, at No. 6 East 46th Street in charge of E. H. Mitcham.

OHIO BRASS COMPANY, Mansfield, Ohio, announces the opening of its new offices at 703 Frisco Building, Ninth and Olive Streets, St. Louis, Mo. This office will be the headquarters of H. W. Kilkenny, district sales manager for the company in the St. Louis territory.

LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, announces the retention of A. M. MacFarland as a general sales and development engineer, and states that he will devote his efforts to the development and special application of automatic carbon arc welding, with headquarters at Cleveland.

ADVERTISING LITERATURE

ROLLWAY BEARING COMPANY, INC., Syracuse, N. Y., has recently issued a new catalog 4-A on their wide series and utility type of bearings and also bulletins: Nos. 53—self-aligning pillow blocks equipped with "Rollway" adapter type bearings to fit standard commercial shafting; 54—Various precision types of "Rollway" radial bearings; 55—Self-aligning pillow blocks equipped with standard "Rollway" bearings and 56—Large "Rollway" bearings in the recently adopted international sizes.

PEREY MANUFACTURING COMPANY, INC., New York, has issued a folder entitled: "The Evening Rush—Gathering in the Shekels by Machinery," emphasizing the advantages of the Perey systems.

INTERNATIONAL NICKEL COMPANY, INC., New York, has issued in booklet form a Monel Metal and Nickel Buyers' Guide.

PYRENE MANUFACTURING COMPANY, Newark, N. J., has issued a folder announcing its "Phomene Accumulator" in which it stresses the advantage of its use as fire protection equipment for liquid hazards.

ARMCO CULVERT & FLUME MANUFACTURING ASSOCIATION is issuing an interesting bulletin, "Basing Confidence in Culvert Strength on Engineering Facts."

79% of all
new passenger cars
ordered during 1927
were equipped with
"Peacock" Brakes,
and 80% of these had



"Peacock" Staffless Brakes

Reg. U. S. Pat. Off.

Look at Table IX in the annual Statistical Issue of Electric Railway Journal, January 14, 1928, pages 60, 61 and 62. 79% of the new passenger cars listed had "Peacock" Brakes! and 80% of these were equipped with "Peacock" Staffless Brakes.

Certainly no further proof of the performance and popularity of "Peacock" Brakes is necessary.

Their light weight, small platform space, low installation cost, simple—yet dependable operation; three times the braking capacity of other brakes, chain winding capacity of 144 inches—enabling them to develop maximum braking power under all conditions—and many other advantages make them especially adaptable to modern cars! That's why they are specified on nearly all new cars!

We'll gladly furnish you with detailed information on request.

National Brake Company, Inc.
890 Ellicott Square Buffalo, N. Y.

Canadian Representative:
Lyman Tube & Supply Co., Ltd., Montreal, Can.



The
Peacock
Staffless

QUICKLY AND EASILY



with Goodyear Type "K" Rims

CHANGING pneumatic tires on trucks and buses is mighty simple and easy when wheels have been equipped with GOODYEAR TYPE "K" RIMS.

No trouble or straining.

Makes all pneumatic tires quickly detachable as well as *demountable at the rim*.

Goodyear Type "K" Rims, made in two parts—an endless section and a split section—are adaptable to all types of wheels, single or dual. Light and strong, they save tires through the reduction of brake drum heat by ventilation of the wheels. The replacement cost is small. May be had in any size required. Guaranteed

by "The Greatest Name in Rubber." They are widely distributed.

Goodyear engineers will gladly co-operate with truck manufacturers who wish to anticipate the popular demand. Goodyear Type "K" Rims will be standard equipment on pneumatic-tired trucks of the future.

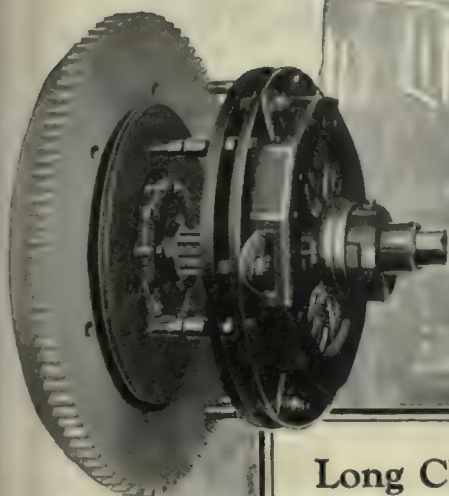
When truck owners and operators change from solid or cushion tires to pneumatics, they will find these rims *efficient, economical and practical*.

Truck and tire dealers should know all about this revolutionary rim equipment designed by Goodyear engineers. Write today to Goodyear at Akron, Ohio, or Los Angeles, California.



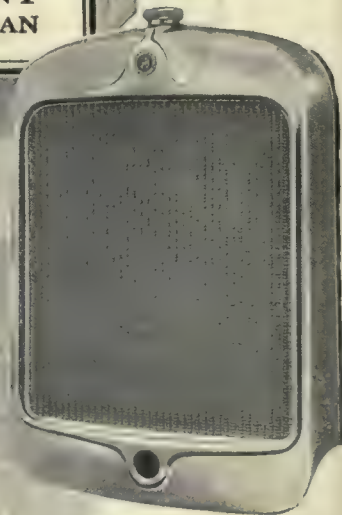
Type K Truck & Bus Rim Equipment

ENDURANCE



Long Clutches and Radiators are built to serve beyond the expected limit of performance. Our engineers are available and are glad to co-operate.

LONG MANUFACTURING COMPANY
DETROIT MICHIGAN



LONG

LONG PRODUCTS—AUTOMOTIVE CLUTCHES AND RADIATORS

Where "low price" and "low cost" join hands

When Reo first announced a 21-passenger bus chassis, fully equipped, many of those who had been paying twice as much for other makes doubted that Reo could combine low price with low maintenance cost.

Here are two out of many instances that prove the amazingly low maintenance cost of Reo busses after hundreds of thousands of miles of steady service:

The Chicago, South Bend & Northern Indiana Railway—operating six Reo Pay-Enter busses purchased simultaneously—found that after 640,622 miles of operation, the total maintenance cost was only *six mills* more per mile than after 354,319 miles.*

Even more outstanding is the record of the Midwest Motor Coach Company, operating between Northwestern Indiana points and Chicago. After 1,800,414 miles of operation, this company found that the total maintenance cost of its 18 Reo busses was $2\frac{1}{2}$ *mills less* per bus mile than when the 12 original busses had been driven only 961,110 miles.*

Convincing evidence that Reo busses—finer today than ever before—are built to run for longer years at a greater profit.

Be sure to try one out—*start it, step on it, stop it.*

REO MOTOR CAR COMPANY, *Lansing, Michigan*

* Complete analysis of figures—exclusive of confidential operating costs—furnished the skeptical on request.

REO BUSES

12 AND 21 PASSENGER

102 YEARS OF MANUFACTURING EXPERIENCE

Cane Webbing may
be ordered through
any H-W sales office.



No. 327 C

For New Cars or Replacement Use

Here is a good-looking, long-wearing, reversible seat that will help you reduce the equipment cost for new cars or for replacement improvements. The 327 C is fairly inexpensive, yet it embodies all the mechanical betterments of our higher priced seats. This modern style has a soft, comfortable spring back and a deep, single-spring, six-inch cushion. The reversing mechanism, made of malleable iron to withstand hard service, is positive and easy in action.

If you are interested in keeping equipment costs down to a minimum, here is a seat that you will appreciate. A note to the nearest representative, listed below, will bring an experienced man who will be glad to furnish complete details and specifications on the 327 C.

*If you have not received a copy of our
new Bus Seat Catalogue, write for it.*



Heywood-Wakefield

REG. U.S. PAT. OFF.

Heywood-Wakefield Company, Wakefield, Mass.; 516 West 34th St., New York, N. Y.;
439 Railway Exchange Bldg., Chicago, Ill. H. G. Cook, Hobart Bldg., San
Francisco, Cal. The G. F. Cotter Supply Company, Houston, Texas. John R.
Hayward, Liberty Trust Building, Roanoke, Va. The Railway &
Power Engineering Corp., 133 Eastern Ave., Toronto; Montreal;
Winnipeg, Canada.



FEWER POLES PER MILE

* *International Creosoted Pine Poles* are so far superior in strength that a lesser number of poles per mile, or poles of smaller diameter are used in line construction than where poles of other species are used, and still maintain the same factor of safety.

International Creosoting & Construction Co.

General Office: Galveston, Texas

*International Poles in signal
service on the Big Four.*

* *International Creosoted Poles* give positive assurance of highest quality. Careful and systematic manufacture results in sound poles to start with. Pressure treatment by proven methods using the best creosote oil assures a permanency, without loss of pole strength, and the continued operation of the line without interruption due to pole failure.



International Creosoted Yellow Pine Poles



Sell Rides!

and let Carnegie Steel Cross Ties help you do it.

A booklet, entitled "Sell Rides," recently issued by the American Electric Railway Association, urges electric railways to promote the use of public, instead of private transportation. "Transportation is a service, the sale of which is subject to the same principles and merchandising practices that apply to the sale of any other commodity to the public."

Of utmost importance is that your service be made as attractive as possible. The ride you sell must be comfortable and uninterrupted.

The basis of a comfortable ride is a smooth, well laid track. A rough track not only offsets the advantages of splendid rolling equipment, but hastens it to a premature discard.

Carnegie Steel Cross Ties, properly laid, insure a comfortable-riding, repair-free track. Interrupted service, due to track repairs, is eliminated. The unit cost (cost per mile of track per year) is lower than that for wood ties.

Our engineers will gladly cooperate with you.

CARNEGIE STEEL COMPANY

General Offices—Carnegie Building

PITTSBURGH, PENNA.

1905

CARNEGIE STEEL CROSS TIES

**Carnegie Products
for
Electric Railways**

Steel Cross Ties

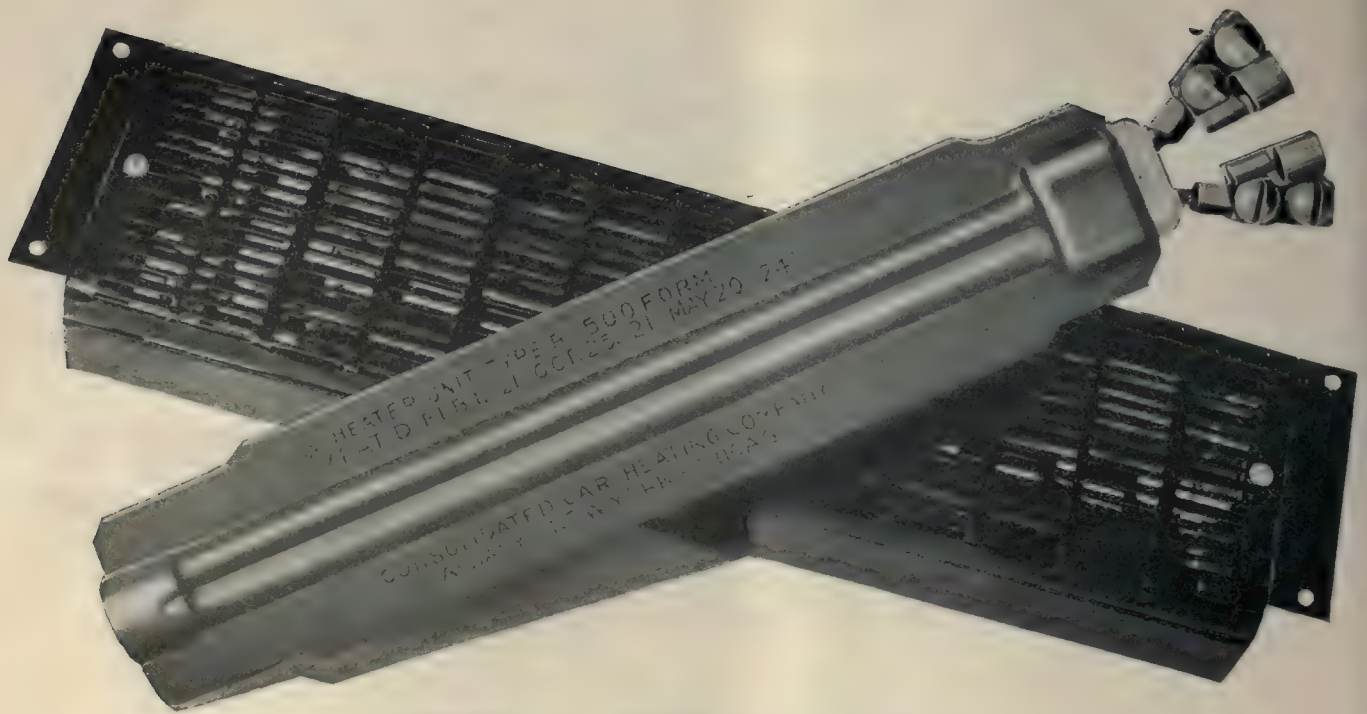
Standard Rails

and Rail Joints

Wrought Steel Wheels

Forged Steel Axles

Steel Shapes, Plates
and Bars



The Element *behind* Consolidated Sheath Wire Heaters

An exclusive feature of Consolidated Enclosed Element Car Heaters is the G. E. Helicoil Sheath Wire heating unit, specially designed for railway service.

This heating element, originated and perfected by the General Electric Company, consists of a coil of heavy nickel chromium wire surrounded by a dense, highly compacted insulating powder, which insulates the heating wire from sheath or casing. As the heating elements are run at a relatively low temperature, brass sheathing is used, thus providing a non-corrosive and non-magnetic material for the casing.

These elements are particularly adapted to car-heating work, being rust-proof, non-magnetic and withstand distortion and mechanical strain without injury.

Approved by the Underwriters' Laboratories.

G.E. Helicoil Sheath Wire Features:

- Rust-proof and non-magnetic.
- Does not deteriorate under vibration.
- Withstands distortion and mechanical strain without injury.
- Rugged terminals with two binding posts.

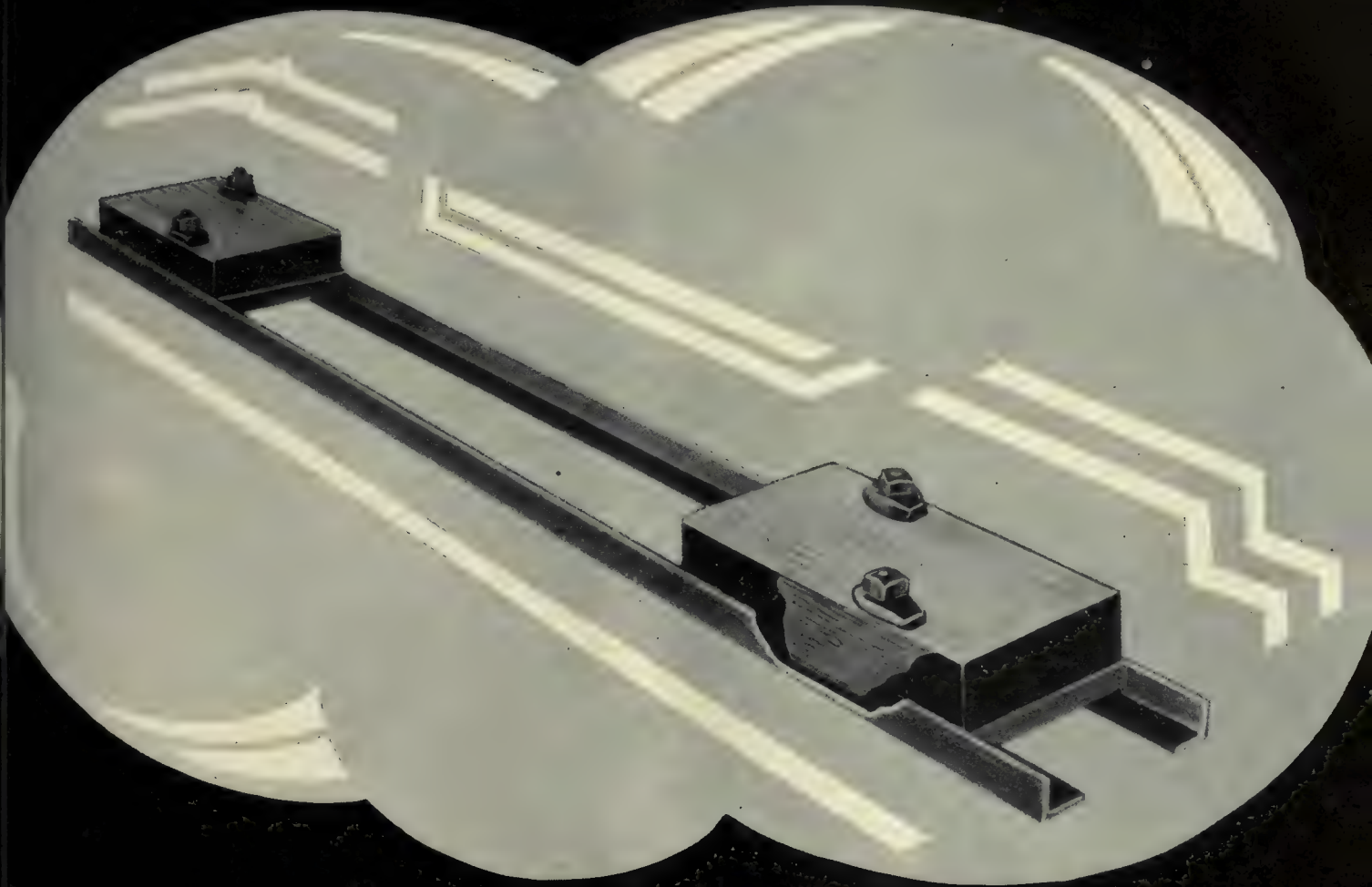
**CONSOLIDATED
CAR-HEATING CO.**

**ALBANY,
N. Y.**



Track can make or break Profits

Dayton Tie Track Makes Them



DAYTON TIES

Track Can Make or Break Profits

Dayton Tie Track Makes Them

The effect of track on revenue and profit goes far deeper than the simple dollar and cents cost. Every part of railway operation is affected by track.

Gross Revenue—People will avoid riding on rough track.

Car Maintenance—Rough track destroys cars.

Rehabilitation—The revenue building effect of new cars may be vitiated by rough track.

Public Relations—Noisy, rough, dilapidated track may destroy public relations you labor to build.

Obviously, anything which has so far reaching effect, should be absolutely right.

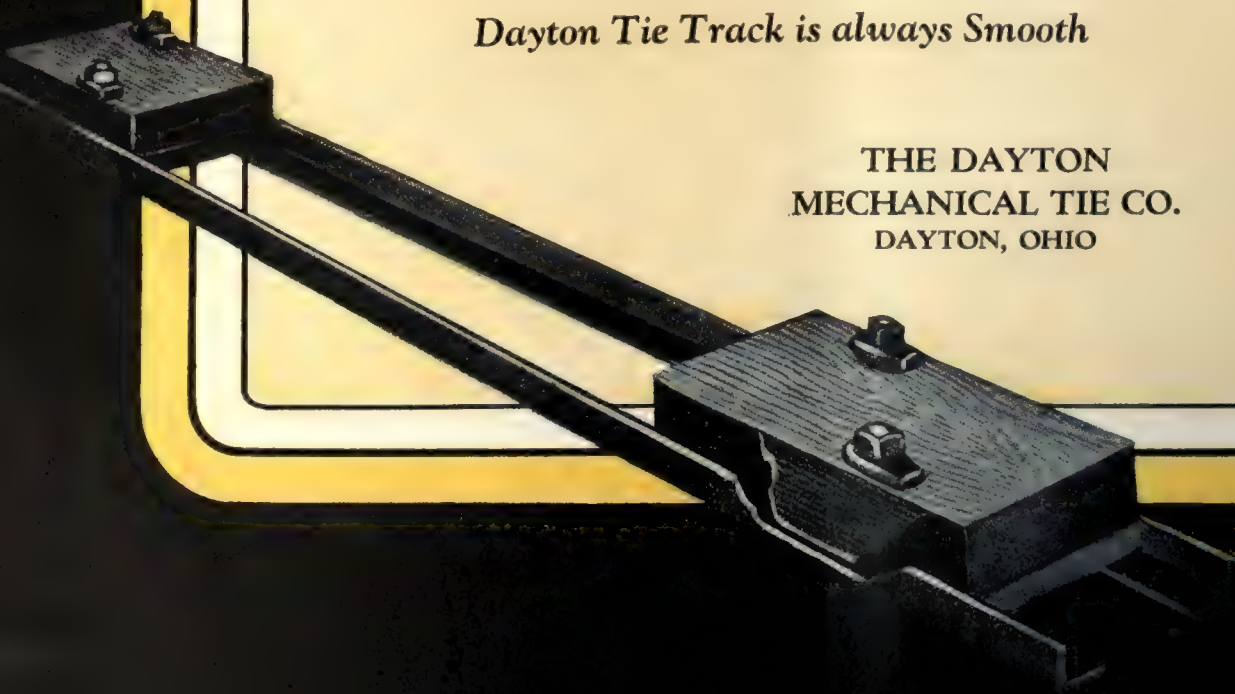
Track laid on Dayton is right, as demonstrated by growing use throughout the United States, is absolutely right.

It remains smooth indefinitely, is quiet, exceptionally easy on rolling stock, comfortable to ride over.

Maintenance is low to the vanishing point.

Dayton Tie Track is always Smooth

THE DAYTON
MECHANICAL TIE CO.
DAYTON, OHIO





900-D
Double Rotating Chair

In combination plush and leather with deep individual seat cushions and divided back. For double-end interurban cars.



900-D
Double Stationary Chair

In combination plush and leather with deep individual seat cushions and divided back. For buses and single-end interurban cars.

Chairs for modern interurban cars

Hale & Kilburn Seats are designed primarily for passenger comfort—the essential characteristic for selling rides in modern interurban service.

Among the many recent H & K 900-D installations on progressive roads are:

Chicago & Joliet—Washington, Baltimore & Annapolis—Chicago, North Shore &

Milwaukee—Texas Electric—Cincinnati, Hamilton, & Dayton—Chicago, South Shore & South Bend—Rochester & Syracuse—Georgia Power Co.—Chicago, Aurora & Elgin—Northern Ohio P. & L. Co.

If you, too, have a new car program or a remodeling program, you will find an H & K Seat to meet your requirements.

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T. C. Coleman & Son, Starks Bldg., Louisville
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Hale and Kilburn SEATS



Zanesville Beautifies the Curb Line

CIVILIZATION moves rapidly, eliminating the makeshifts and making obsolete the practices of yesterday. Thus ornamental steel poles for transmission and distribution lines are replacing the old-style, ugly wooden poles just as the electric light displaced the kerosene lamp.

Take Zanesville, Ohio, for instance. There, 525 Union Metal Heavy Duty Fluted Steel Poles will soon replace the cumbersome wooden ones along the curb line. The first section of the new system is now installed and carries both the trolley-span wires and the over-head equipment. Instead of irregular rows of wooden

poles of varying size, clean cut, artistic Union Metal poles extend in straight lines down the street, adding much to the dignity of the thoroughfare.

Zanesville is reaping the benefits of Union Metal advantages: the low installation and maintenance costs, the ease and speed of replacement, proper ventilation, the anchor rod construction and the unusual strength and durability.

Many other cities are having the same experience. Write for detailed information and see how Union Metal poles can be adapted to your own local requirements.

THE UNION METAL MANUFACTURING CO.

General Offices and Factory, Canton, Ohio

Branches — New York, Chicago, Philadelphia, Cleveland, Pittsburgh, St. Louis, Los Angeles, San Francisco, Jacksonville.

UNION METAL

DISTRIBUTION AND TRANSMISSION POLES

PIN TERMINAL RAIL BONDS



View of 20th Century rounding bend at Marblehead. The New York Central is always among the leaders in modern equipment. Insert shows our type CPO1 Bond used on all main line tracks

BECAUSE of the ease of installation, Pin Terminal Rail Bonds are used on many of the larger railway systems. They are accessible for inspection, show low maintenance cost, insure strong contact and low resistance.

The American Steel and Wire Company has a rail bond for every requirement. Our engineers will be glad to assist you in selecting the best bond for your needs.

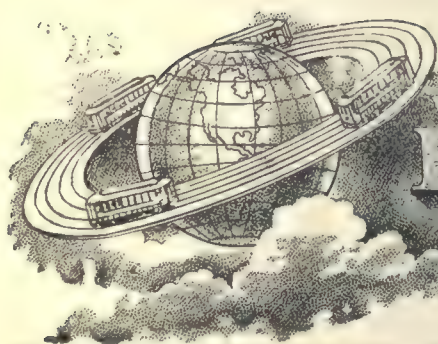
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JUST as the electric railway companies have to compile and be guided by exhaustive statistics as to peak loads, traffic densities, costs per mile, and so forth, we must constantly keep ourselves informed as to purchasing power, density of population and all vital market information in order to maintain our service as an active asset of your service.



Barron G. Collier

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AMCRECO PRODUCTS

do not decay

UNTREATED piles, poles, ties and timber decay—in some cases very rapidly.

But Amcreco products resist this attack of nature. They are preserved by full pressure treatment by the Lowry process using pure creosote oil. Years of experience have demonstrated the preservative and practical value of creosote oil in wood preservation. Similarly, the superiority of the Lowry process has been firmly established.

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COLONIAL
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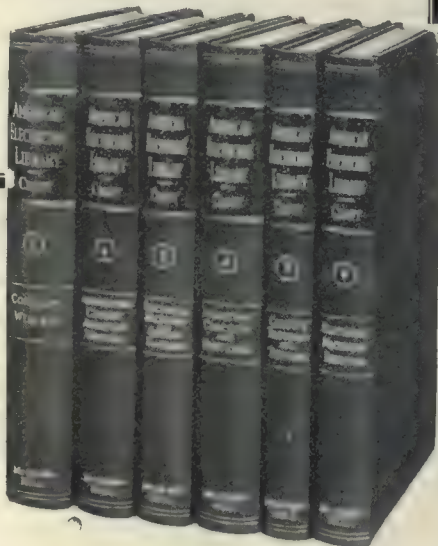
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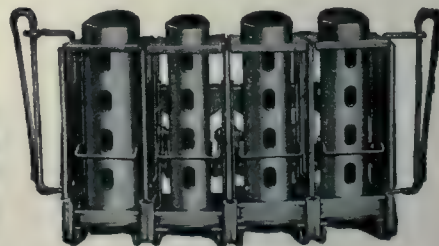
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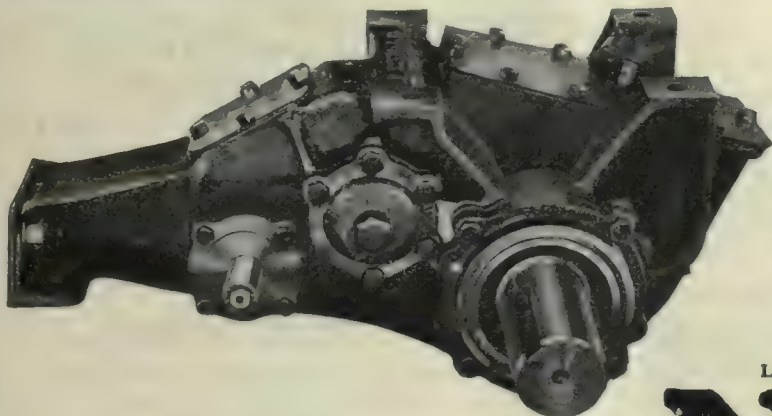
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Smooth, quiet operation with the New W-N Drive

The new W-N Drive is especially designed to permit the use of modern high speed, high efficiency motors on electric cars. Heat-treated and hardened helical gears, mounted on Timken Roller Bear-

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All Westinghouse Electric & Mfg. Co.
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Nuttall

PANTASOTE

TRADE MARK

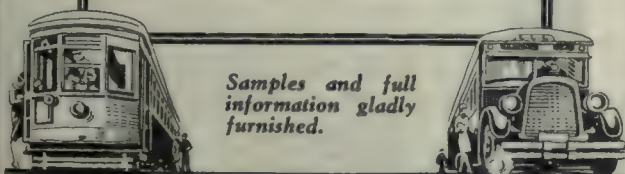
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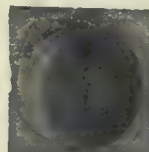
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Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

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Free-Winding Tension Spring
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POSITIONS WANTED

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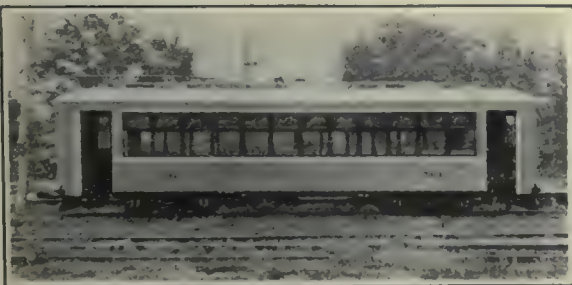
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Westinghouse Air Brake Co.

Anchors, Guy
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General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Works
Elec. Service Supplies Co.

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Stands
Ramapo Ajax Corp.

Automatic Safety Switch
Stands
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Cincinnati Car Co.
Columbia Machine Works
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Side
Columbia Machine Works
Stucki Co., A.

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Consolidated Car Heating Co.

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Cincinnati Car Co.
Columbia Machine Works
Elec. Service Supplies Co.

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Railway Track-work Co.

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Graham Brothers

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Babcock & Wilcox Co.

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Electric Service Supplies Co.

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Una Welding & Bonding Co.

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Brill Co., The J. G.
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Brake Parts
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Brill Co., The J. G.
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General Electric Co.
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Manganese
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Cables)

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Black Varnish
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Irvington Varnish & Ins. Co.
Mica Insulator Co.

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Westinghouse E. & M. Co.

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Cincinnati Car Co.

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Differential Steel Car Co.,
Inc.

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Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

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Brill Co., The J. G.

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Express, etc.
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Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.

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Electric Equipment Co.

Cars, Self-Propelled
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or Copper
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Columbia Machine Works

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Trolley
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(Continued on page 46)

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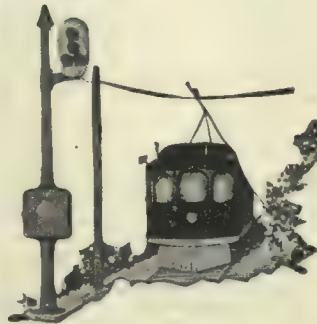
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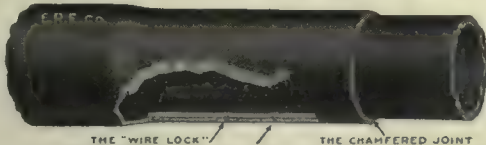
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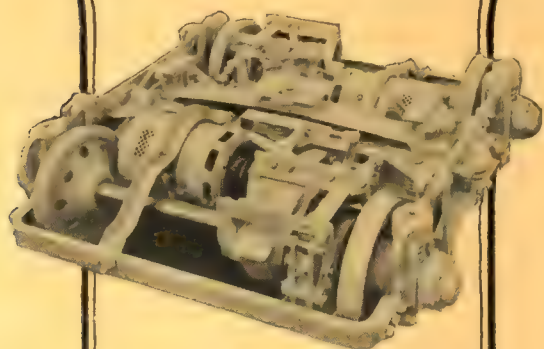
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Annual Maintenance Number NEXT WEEK!

NEXT week's issue of ELECTRIC RAILWAY JOURNAL is the Annual Maintenance Number. Here will be discussed specifically the improvement of maintenance and construction practice in the various divisions of equipment, track and overhead line departments.

There are articles on equipment maintenance; steel and wood tie track; lubrication; insulation; overhead line; shop practices; controllers; welding; door devices. Each article is written by a specialist.

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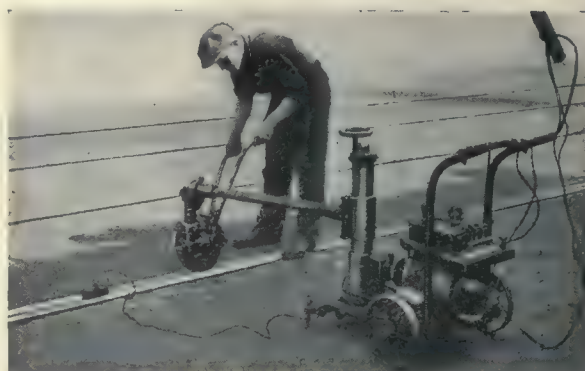
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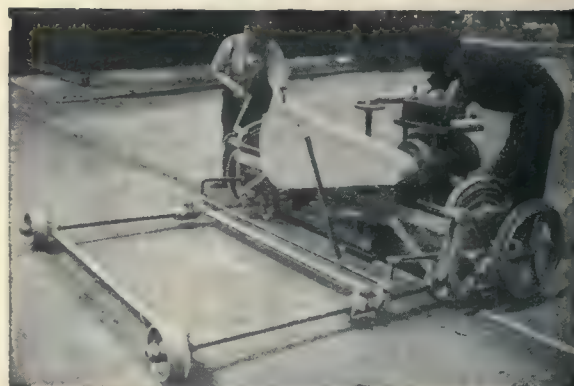
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Chester F. Gailor, 30 Church St., New York City
Chas. N. Wood Co., Boston
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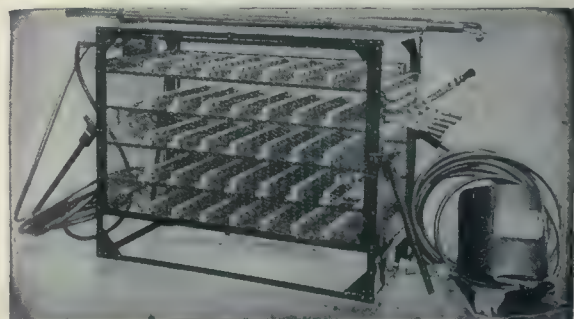
Eureka Radial Rail Grinder



Vulcan Rail Grinder



Reciprocating Track Grinder



"Ajax" Electric Arc Welder

BETTER RAIL, BETTER TRANSPORTATION



with MARATHON EARS

IF YOU save a penny here and a penny there, and the hundreds of other places on the operating end where it is possible to save—net earnings will soon begin to swell with the ferment of economy. For one per cent saved in operating expenses adds nearly 20% to the net.

You can be absolutely certain of substantial savings by adopting Marathon Ears. No other type of ear approaches it in length of service—number of car passes or ear life measured in days. Competitive tests made by any number of progressive railway properties prove it. Some time ago we published the facts about one Marathon Ear which stood the gaff of 701,478 car passes. This is an exceptional record, of course. But 200,000 to 400,000 car passes are *not* unusual. Think that over!

No practical railway man need be told of the necessity for economy in maintenance and operation. The most that he asks is to be shown how and where it may be accomplished.

We cordially ask you to see if it can't be done with trolley ears. Test Marathon Ears on your lines *against the field*. That's all we ask.

The 5 Points of Service

- (1) Easy approach
- (2) Smooth underrun
- (3) Protection to the wire
- (4) Correct proportioning
- (5) Extra long life

Ohio Brass Company, Mansfield, Ohio
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Ohio Brass Co.

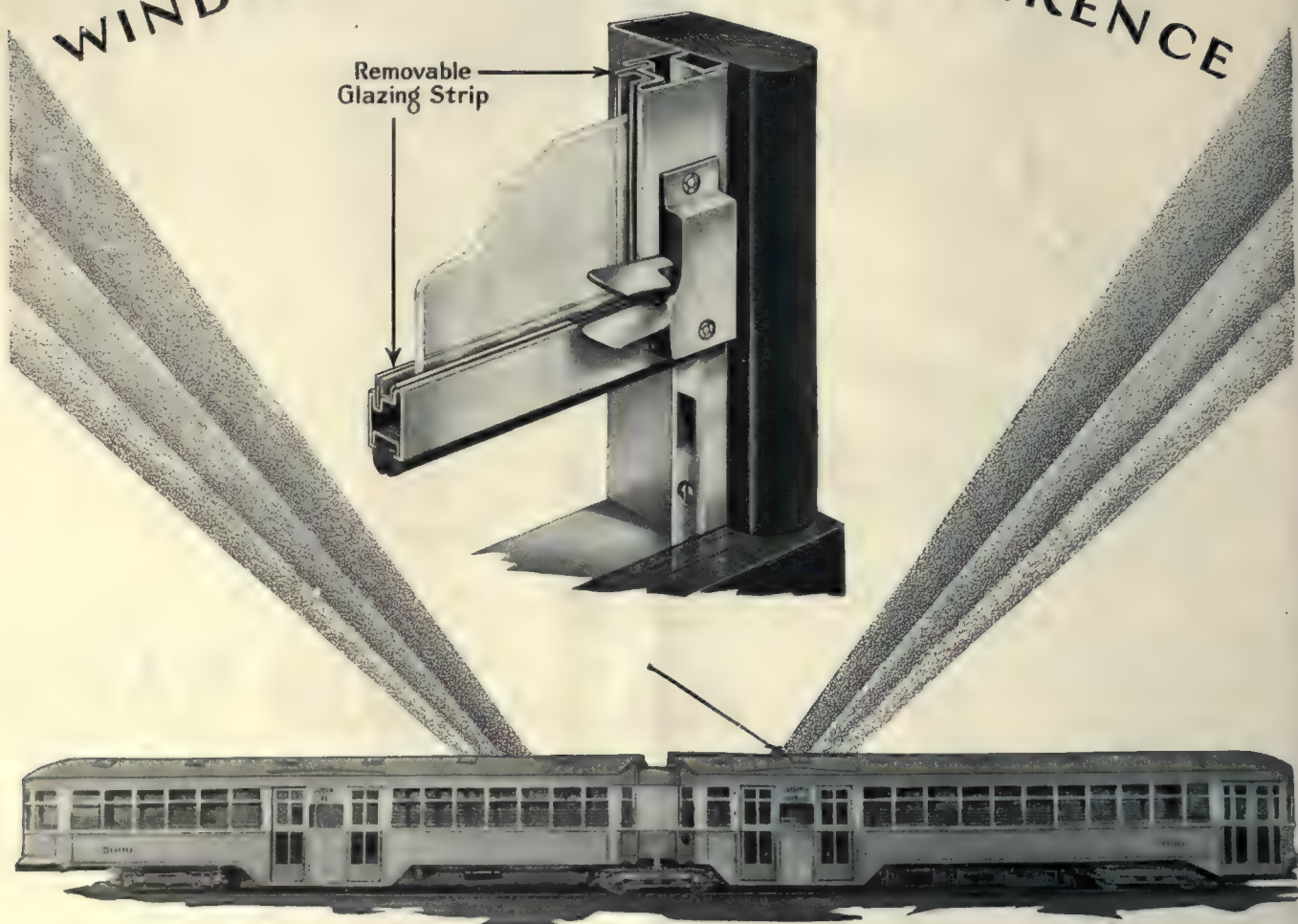
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WINDOWS DO MAKE A DIFFERENCE



This new sash saves glass replacement time

Edwards Metal Sash with Removable Glazing Strips cuts over three-quarters of the time spent in replacing window glass.

Sash need never be taken from opening for reglazing. The construction is so simple that even an inexperienced man can do the job in two or three moments. No car or bus out of service because of broken windows... no delay or annoyance to passengers.

Forty-one years of experience with window accessories are behind the perfection of this new sash. The advance in design will save electric railway companies many thousands of dollars in time and labor.

Detailed information sent on request.

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*Illustrated above:
New Cleveland Railway
Co. Articulated Car using
Edwards Metal Sash with
Removable Glazing Strips.*



Edwards Metal Sash



AN INSPECTION TOUR
OF THE WELL EQUIPPED
CAR

*A convenience the
public appreciates*

FARADAY PASSENGER SIGNAL SYSTEMS

Build up your prestige and your patronage by providing every convenience for the riding public—such as reliable, easily reached Faraday passenger signal systems.

Faraday Car Signal Systems constitute a complete line of high and low voltage bells, buzzers, resistances, and pushes. These different devices are substantially constructed to withstand long service.

They enable passengers without commotion to signal the motorman to stop at intersections. They may also be used for various other signaling requirements.

Send for full particulars of Faraday Signal Systems. Also for details of other Keystone Equipment used on the modern well-equipped car.

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Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 85 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES Co.

MANUFACTURER OF RAILWAY, POWER

AND INDUSTRIAL ELECTRICAL MATERIAL





The 5 o'Clock Rush

Thousands of feet hurrying toward the tracks that lead to *home*; thousands of minds centered on *home*; thousands of tired men and women depending on electric railway service to get them *home*.

And electric railway service seldom fails them!

..... GARY WHEELS play an important part in the dependability of electric railways because, being of *wrought steel*, they combine the advantages of forging with those of rolling. They are made in a modern plant and rigidly inspected at every stage of manufacture. Their increasing use is the best evidence of their quality.

Illinois Steel Company

General Offices: 208 South La Salle Street
Chicago, Illinois

G A R Y
WROUGHT STEEL WHEELS





1 or 1000

No need to wage a losing fight!

Not when reinforcements are right at hand!

The engineer with his back to the wall, struggling against rising costs, more and more joints going bad, limited budgets for doing the work, is up against it. He must do something! Just patching joints and patching again is only putting off the inevitable day of reckoning.

Thermit Welding is the answer! It settles the problem of joint repairs, just as it has settled the problem of total joint elimination in so many big track construction jobs.

Thermit Welding is proving just as successful, just as economical, just as logical for scattered joint repair jobs, as it has for straight-a-way track laying jobs.



If you're not posted on what Thermit does, ask Birmingham; ask Grand Rapids, ask Milwaukee, or a hundred others.



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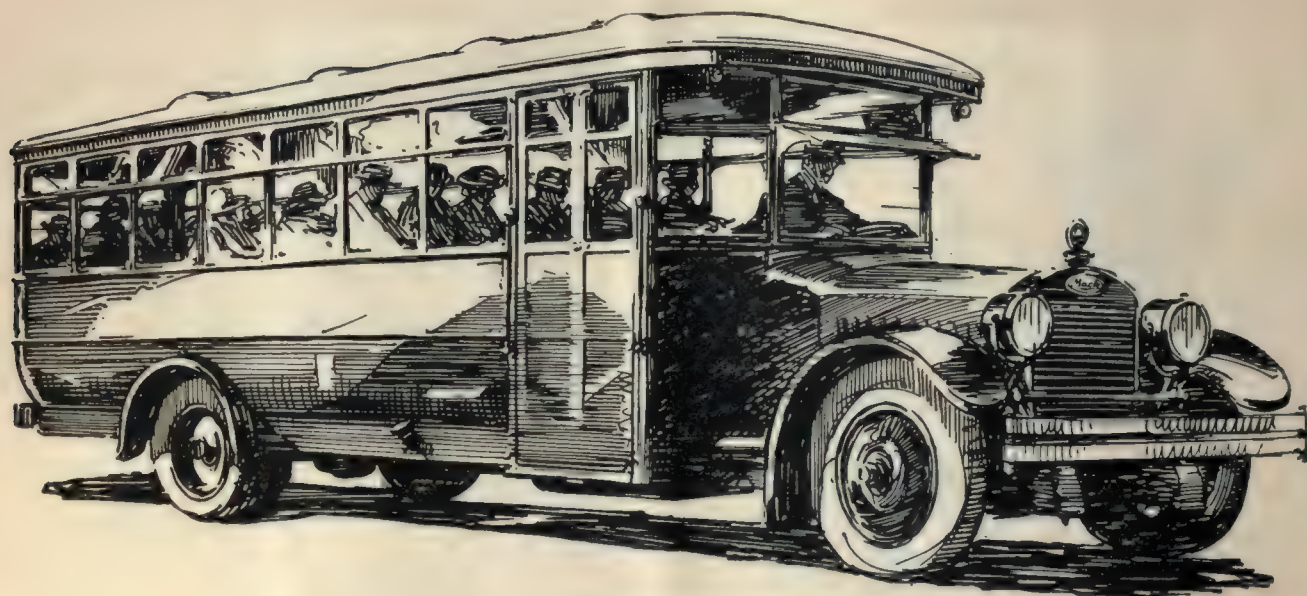
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For Coach Operation

WESTINGHOUSE AIR BRAKES



Westinghouse Automotive Air Brakes have been adopted as standard equipment by leading manufacturers.

—increase revenue by facilitating the use of vehicles of higher carrying capacity, and permitting higher schedule speeds in safety.

—save time by allowing drivers to confidently hold close formation in traffic lanes, eliminating the annoying small car cut-ins from side lanes.

—make for satisfied drivers, by minimizing physical effort in braking—one of the most arduous operations of modern coach control.

—stimulate public confidence in the stopping ability of the modern heavy coach whose power and speed rivals that of the trimmest roadster.

WESTINGHOUSE TRACTION BRAKE COMPANY

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WESTINGHOUSE

AUTOMOTIVE AIR BRAKES

TILES IN TRACK CONSTRUCTION

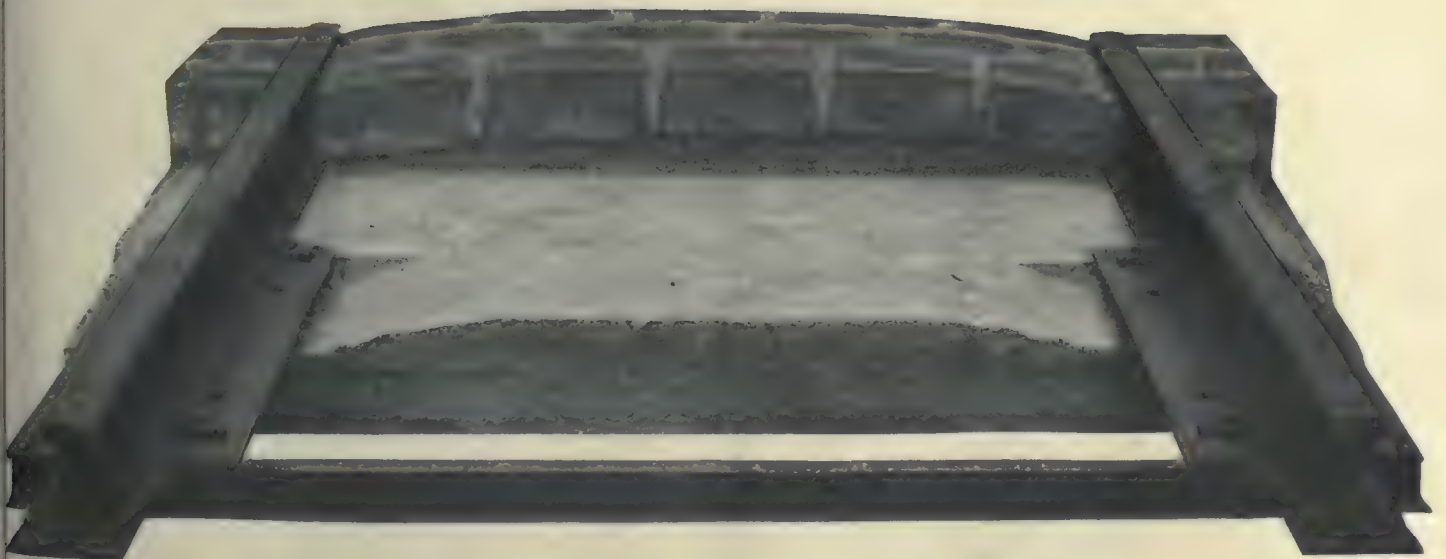
6

This is No. 6 of a series on paved track design with STEEL TWIN TIES as used in over 45% of the cities of over 200,000 population in the United States. No. 7 will appear in an early issue.



TODAY

- No. 1 Cincinnati
- No. 2 Boston
- No. 3 Detroit
- No. 4 Philadelphia
- No. 5 Kansas City
- No. 6 Cleveland
- No. 7 Washington
- No. 8 Buffalo


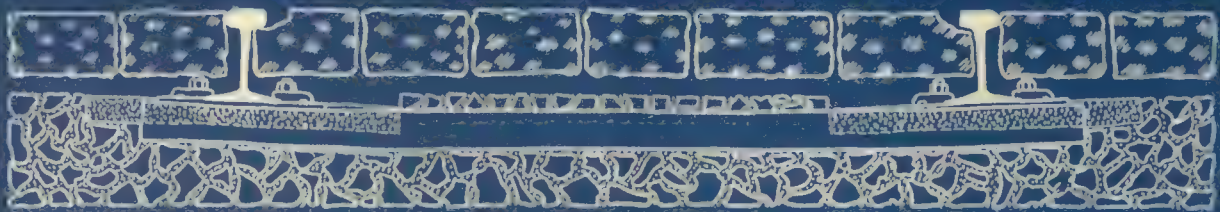


STEEL TWIN TIE TRACK

THE BASE OF MODERNIZATION



In Cleveland



STEEL TWIN TIES were furnished for Payne Avenue, Cleveland, with the ends bent upward to cant the rail 1 in 25 and punched for 102-516 Tee rail. The Clark joint was used in this construction, and the track was paved with granite block.

Complete detailed drawings and specifications will be sent on request.

Engineers of The International Steel Tie Company have played no small part in the design of better, more lasting track. We have in our files a fund of data on paved track construction that is at your disposal. We will be pleased to discuss with you your paved track problems, and to help you start your modernization program right. Steel Twin Ties are the first step toward better service, and lower initial and maintenance costs.

The International Steel Tie Co.
Cleveland, Ohio



TWIN TIES ARE ALL STEEL



also—

On the Safeway Buses

ordered by the

**THIRD AVENUE RAILWAY CO.
OF NEW YORK**



TREADLE DOORS

have been specified to handle crowds with the efficiency found only in
CIRCULATING LOAD

National Pneumatic Company

Executive Office: Graybar Building, New York

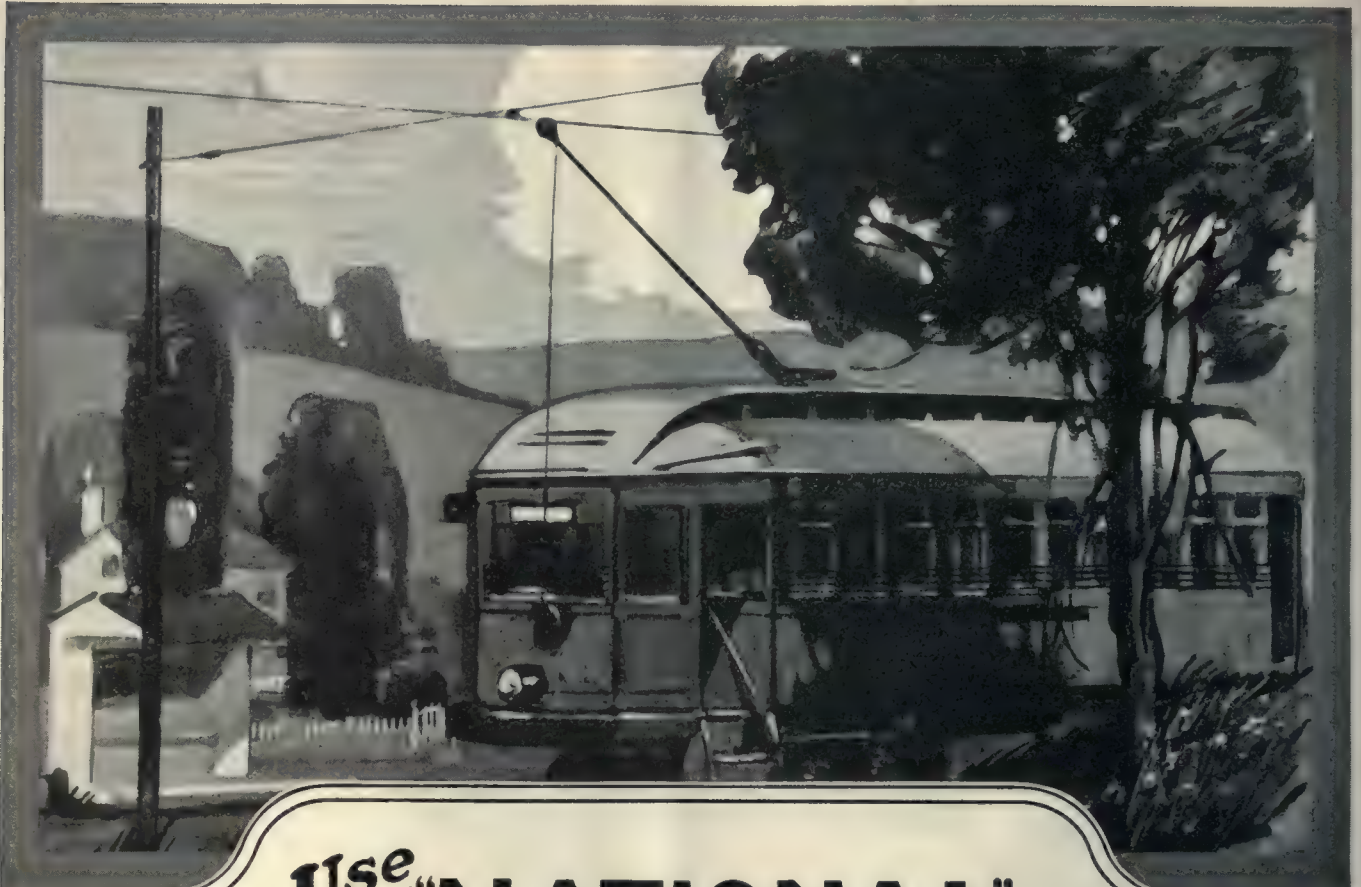
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MANUFACTURED IN TORONTO, CANADA, BY
Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
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Use **"NATIONAL"**
SHELBY
Seamless Steel Trolley Poles

THE "NATIONAL-SHELBY" Trolley Pole is regularly manufactured in two designs, Standard "A" and Standard "B."

Standard "A" pole design is suitable for all ordinary service and makes the lightest pole it is practicable to manufacture or use.

Standard "B" pole, speaking generally, is 20 per cent heavier and 50 per cent stronger than the Standard "A" pole. This design is intended to meet the most severe service conditions.

Both are made from the same grade of Open Hearth steel, and in manufacture the material is cold drawn and annealed in such a way as to give a good grain structure and insure sufficient elasticity.

Special designs, varying in some or all particulars from the standard designs, are made to meet special requirements.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
District Sales Offices in The Larger Cities



“LIGHT-WEIGHT—

—WITH STRENGTH”



The Cincinnati Car Company has new and vitally important data to present. It is for the attention of street railway executives who are looking ahead of replacements as well as those who have the question under immediate attention.

The data definitely links “lightweight with strength” with increased revenues and reduced operating and maintenance charges. It brings sharply into the light the true proportions of the burden which excessive weight imposes.

Whether the question of replacements is uppermost or not, arrange to study **THE LATEST DEVELOPMENTS IN LIGHTWEIGHT CONSTRUCTION.**

CINCINNATI CAR COMPANY
CINCINNATI, OHIO

CINCINNATI BALANCED LIGHTWEIGHT CARS

The Four Features of **BALANCED DESIGN** are the Cardinal Points of Today's Demand



Interurban operators sought these features in a fare register

The National Fare Register was not introduced until it embodied all of the practical suggestions gained in long contact with interurban operators and actual field tests.

"It must be fast," said the operators, "it must give absolute control of fares, prevent over-riding, be convenient to conductor or motorman and passenger, tie in with our auditing system and be accurate in its operation."

National Fare Registers meet those requirements and go a step beyond. The prominent indication is visible to passengers, making them inspectors of the record made. A keyboard, fast and positive in its action plus electric operation, speeds up loading.

The printed detail-strip gives a complete, locked-up record of every fare. Printed tickets showing zone from and to and amount and kind of fare paid are issued to passengers and collected at the end of the ride.

This ticket shows whether or not the passenger is leaving at the zone paid for and prevents over-riding.

Complete information about these and other features of National Fare Registers is available from our nearest representative or by letter or wire to Dayton. Also many interesting facts on savings and profit increases which have resulted from the use of these machines.

Improved Ticket

The ticket issued by a National Fare Register is convenient for passengers to handle without folding. It is printed on heavy stock and its printing is always legible even though crumpled.

NOV-3 011

DO NOT DESTROY TICKET

25-35 -55★ -02

From To Fare Oper.

Surrender ticket when leaving.

1 National Transit Co.
Anywhere, U. S. A.

Important Features

Prominent indication. Fast keyboard. Electric operation. Printed record of every fare. Total of all cash fares. Small size and strong construction. Improved ticket. Repeat key.

Ticket, Actual Size

NATIONAL FARE REGISTERS

The National Cash Register Company
Dayton, Ohio

The Best Teacher

LET it guide you in the selection of your poles. Study first what poles have proven by experience to be the most satisfactory in service;—and next study the experience of the companies producing such poles.

Your study will show that the Creosoted Pine Pole is the strongest and most durable of the pole woods; that it will carry heavy loads, withstanding the strain of wind and sleet storms. This pole's reputation has been established as indicated by an increase of 370% in the number of pine poles creosoted from 1920 to 1925.

Fifty years of successful experience in timber preservation places the *International* Company in a distinctive class. Its installations extend from coast to coast. *International* poles, time tested for 28 years, are perfectly sound and still in service. *International* stands for the very best in timber production and preservation—sound timber, careful manufacture and scientific treatment with the full quantity of high grade creosote.

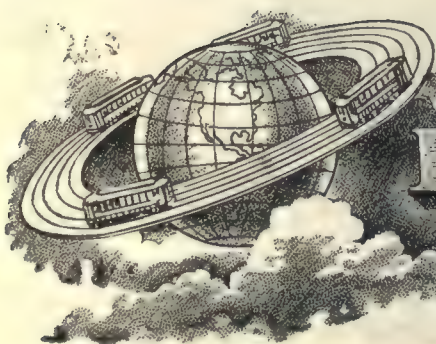
Illustration shows International Creosoted Pine Poles installed in the lines of the Des Moines Electric Co. carrying two 3 phase circuits.

International Creosoting and Construction Co.
Texarkana — Beaumont — Galveston



International Creosoted Yellow Pine Poles

JUST as the electric railway companies have to compile and be guided by exhaustive statistics as to peak loads, traffic densities, costs per mile, and so forth, we must constantly keep ourselves informed as to purchasing power, density of population and all vital market information in order to maintain our service as an active asset of your service.



Barron G. Collier

INCORPORATED

CANDLER BLDG. NEW YORK

"Practically all of our cars are now Kelly equipped"

*Twelve Miles from Chico, Butte County, Cal.
Hotel Open During Entire Year*

Richardson Mineral Springs

J. H. RICHARDSON, Prop.

LEE RICHARDSON, Mgr.

These waters are noted for being a cure for Rheumatism, Stomach Trouble, Malaria, Kidney Trouble, Dropsy and Peptic Ulcer—Also Dyspepsia, Blood Diseases, Skin Diseases, Nervous Trouble, etc.—All waters bottled for shipment in case lots.

Hotel Rates Reasonable and Include Steam and Mineral Baths Every Day

Kelly Springfield Tire Co.,
560 Ninth St.,
San Francisco, Calif.

Richardson Springs, Chico, California, October 21, 1927

Gentlemen:

Here is a picture of our three ton Gramm-Kincaid bus, equipped with Kelly Springfield tires.

These tires have been on this bus since last December making an average mileage of thirty miles daily, which is approximately 8100 miles since the tires were put on.

From the appearance of the tires, we can expect at least double that in additional mileage.

It may be of additional interest to you to know that because of the performance of these tires on our bus that practically all of our cars at Richardson Springs are now Kelly equipped.

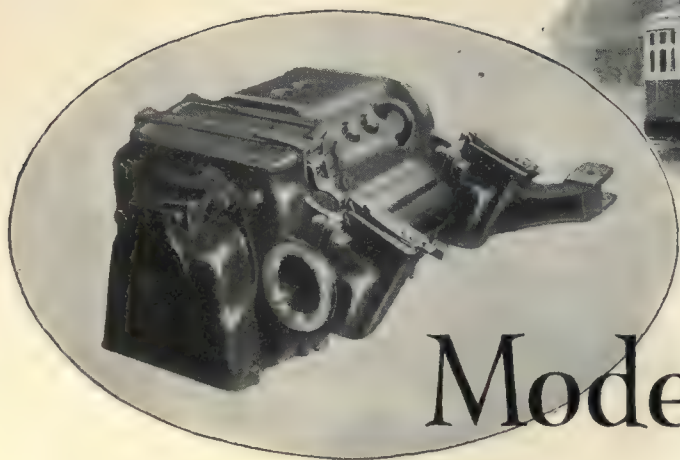
LR:A

Yours very truly,

J. H. Richardson



KELLY-SPRINGFIELD TIRES



Modern equipment returned 25 per cent

The Georgia Light and Power Company's recent program of modernization at Atlanta involved 170 new one-man cars and has shown a return of 25 per cent on the investment. Revenue was increased because of the higher speed, larger capacity, lighter weight, and attractive appearance of the new cars; and operating expenses were materially reduced.

These new cars, equipped with G-E motors and control, have traveled 15,874,570 car-miles with only six armature rewinds. During the eight months ended August 31, 1927, they ran 4,821,132 miles with one electrical failure per 321,000 miles. Pull-ins have been reduced to one per 28,578 miles.



Forty additional new cars, equipped with the same type G-E motors and control, have only recently been placed in service in Atlanta.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of *Street Railway Journal* and *Electric Railway Review*

Published by McGraw-Hill Publishing Company, Inc.

CHARLES GORDON, Editor

Volume 71

New York, Saturday, March 10, 1928

Number 10

Commemorating a Service to Humanity

IF THERE is any doubt left at all about the importance of the rôle played by the individual employee in the success or failure of a railway's operations, that doubt is dissipated by the events following the Brady Safety Medal Award to the Louisville Railway. This company, through its president, J. P. Barnes, accepted the award in the name of its employees, and then gave the men themselves the opportunity of celebrating in adequate fashion their accomplishment in the service of humanity. The unique celebration took the form of two great dinners—one for day men and one for men on night runs—given to 2,400 employees and their wives.

It was particularly fitting that this dinner commemorated two other notable events in Louisville. During the preceding month every carhouse on the property had exceeded the record of 25,000 miles per chargeable accident which had been set as the bogie for eligibility to one of the safety dinners that have come to mean so much to Louisville trainmen. The occasion also witnessed the annual award of the Anthony F. Connelly medal to William T. Kays, a motorman on the Oak Street car line, for outstanding public service. This medal, fittingly named in honor of an employee who died three years ago after 50 years of railway service, has come to typify the spirit of public service on the Louisville property.

There is something deeply impressive in this story of 2,400 trainmen and their wives sitting down at a dinner to celebrate collectively their own good work in the interest of humanity and to honor specially one of their own number who had achieved outstanding recognition. Can one doubt but that each of these men went back to his car with the feeling that his job means something more than merely putting in a given number of hours for a specified rate of remuneration? Suppose, then, that each street car operator went forth daily with the conviction that he is concerned not only with the effect an accident might have upon himself and the company, but also with the discomfort and suffering which it might entail; and suppose that he came to see clearly that an accident avoided through his own alertness, regardless of the carelessness of others, is a direct contribution to the welfare of humanity and to the progress of civilization. Suppose he came to regard himself as entrusted with a power to protect human life and property, equal, or in some respects greater, than that of his superiors.

To establish such an *esprit de corps* in its carhouses is the desire of every progressive railway management. But men do not react to such sentiments until they come to understand in its full significance the part they play in their company and to feel the motives that inspire its management. Since time immemorial, the act of breaking bread with a man has been associated with friendliness; and that is the first step toward confidence and understanding. When motorman and manager sit at

the same board to commemorate mutual accomplishment in the preservation of human life and happiness the service of humanity becomes a meeting ground of mutual inspiration. Any man who works in this spirit does not live in vain, and any man who helps him to see himself in this light renders no ephemeral contribution to the transportation industry.

The Doctrine of Thrift Is Still Sound Today

THOMAS E. MITTEN did workers everywhere a real service when in the series of articles about him in the *New York Sun* he sounded a note of warning about following what he called "The New American Religion." He was referring, of course, to the practice, particularly by the wage earners of all classes, of mortgaging their future so as to secure present comforts that they have been led to believe are essential to their happiness. No one decries the right of the worker to aspire to better things—so long as they are better things. It is highly desirable that he should, desirable from his standpoint and desirable from the standpoint of better business. But that desire is fraught with great danger, danger alike to the man who permits his wants to outstrip his capacity to pay, and danger to business itself.

Since electric railways are such large employers of labor, these admonitions may well be sounded through such channels as are at the disposal of the railways. Mr. Mitten sees an economic change as inevitable. He says that the doctrine that prosperity depends upon spending freely and pledging future earnings has been sponsored even by business men who would not consider such a rash policy in the financial management of their own properties. In this he is right. He is just as right as the banker was who some time ago said that the trouble with America is that many men are riding around in Packards who ought to be using Fords and that many are riding around in Fords who ought to be pushing wheelbarrows. There was a certain amount of literary license about this characterization, but there was also about it a very large element of truth.

In the present era of inordinate prosperity in the United States a lot of pseudo economics has been paraded which will not stand the acid test of the crucible of experience. The baser metal of slipshod thinking has passed for the gold of fact. Mr. Mitten pointed out that the wise business man uses the surplus of his good years as a cushion for the bad years and that the business man owes it to his workers and his customers to educate them in similar conduct of their personal finances. Many other far-sighted men in business, particularly those who have fostered employee ownership, have made a serious effort to encourage a sound economic policy among the men in the ranks. In recent years, however, anyone who propounded the idea of thrift was likely to find himself *persona non grata* in

many quarters. Thrift and parsimony are very different things that have too often been accepted as one and the same. There is one thing about it—few ever had cause to regret the practice of thrift, but countless numbers have had cause to lament their profligacy. The man who earns \$10,000 a year and lives beyond his means is no less profligate than the motorman who permits his outgo to exceed his intake. Each is equally doomed. The doctrine of thrift is as sound today as it was when it was first enunciated by "Poor Richard."

Developing Latent Transport Possibilities

RECENTLY the surprising statement was made by a real estate man that the necessity for adequate parking space will soon force the development of suburban business areas which ultimately will sound the death-knell of retail stores in the larger urban centers. His prediction was based on the difficulty of finding parking space in the centers of certain of the large cities.

A statement such as this certainly shows a very narrow viewpoint. It entirely overlooks the possibilities of public transportation. Should any large number of persons decide to do business in the outskirts because of lack of facilities in the center of the city it would be just that much easier for the street cars and buses to move through the congested districts. This in turn would lead to a larger use of public transport and with it bring greater prosperity for the stores in the central area.

However, to plead for public transportation without giving further thought to it than this would be to leave it just where it has been for a number of years. Even with a reduction in the use of automobiles in the congested district there is need for considering the advantages and limitations of every type of vehicle, both public and private. It is possible to provide better facilities, give higher speeds, and keep the cost commensurate with the value of the service, only if all the transportation agencies are fitted into the picture where they will appear to the best advantage.

Few persons are able to view the entire traffic and transportation problem of a community in such a broad-gauge manner that they can determine absolutely the proper place for each of the various vehicles. Even in the matter of parking, well-intentioned city officials have been forced to back down when the merchants have demanded that the ban be lifted. What is needed is not alone co-ordination of services to give real transit relief but a control which will enforce such co-ordination.

A move such as that outlined above has been made in London within recent months in the appointment of a Minister of Transport, who has supervision over all forms of transportation in the metropolitan area. A somewhat similar development has taken place in this country in the appointment of the Port of New York Authority, which has control not only over passenger transport but also over the rivers and harbors in the port and all the rail and highway lines leading to the port. These bodies are making steady progress in dealing with the problems of local transportation. But they are only instances where outstanding communities have attacked the problem. It exists in every city and metropolitan district, and only by careful analysis can the proper solution be arrived at that will give the transport that is needed to develop the possibilities that lie dormant in any locality.

Detroit's Express Line Deserves an Extended Trial

OPERATION of the express street cars service with supplementary local buses on Jefferson Avenue in Detroit is provoking widespread discussion among various factions in the motor city. The article on this operation published in the Jan. 7, 1928, issue of *ELECTRICAL RAILWAY JOURNAL* has been followed by various supplementary developments. The most recent items, published last week on pages 358 and 376, refer to the results of a questionnaire sent out to operators of automobiles and trucks by the Traffic Survey Bureau of the Detroit Police Department, and to a report made by the city's Rapid Transit Commission.

It is unfortunate that this initial installation includes so many special conditions that the full possibilities of the plan and its suitability for application on other streets and in other cities becomes difficult of determination. Nevertheless it is important, now that the project has been in operation since Sept. 18, 1927, that every effort be made to derive from experience a full analysis of the possibilities and limitations of the idea.

Observation of the Detroit operation indicates several interesting features. First of these is that the elimination of many car stops and the regulation of other traffic to synchronize with the movement of public transportation vehicles speeds up all traffic on the street and materially reduces interference and congestion. Furthermore it has been demonstrated that the scheme of furnishing local service with supplementary buses does not demand an excessive number of buses, because only a small proportion of the passengers carried on the cars actually use the combined service. Of course this situation is subject to considerable variation, depending on the travel characteristics of any given street; but the Jefferson Avenue operation indicates that such a combined service can be operated with only a small proportion of the number of buses that would seem to be required from a purely theoretical analysis of the plan.

Beyond this point it is hard to draw definite conclusions regarding costs or the effectiveness of increased speed in attracting riders. It is important to bear in mind that the present operation includes many expedients and does not represent in any way the full possibilities of the express service. An important change was made in the route simultaneously with the starting of express operation. This consisted of cutting the old Jefferson Avenue-Grand River through line. The experiment was started on a street having many special traffic conditions that are not typical because of the absence of normal cross traffic. Another factor to be considered is that some of the oldest type of cars in Detroit were used for starting the express line. The buses used for the local service were not selected with a view of meeting the particular requirements of this type of service, but were adopted for the purpose merely because they were available. The existence of competition by independent buses and by numerous jitneys, still further complicates the problem of analyzing the economics of the new service.

All of these conditions must be borne in mind when attempting to draw conclusions. Obviously, the success or failure of the idea, or the possibility of its extension should not be judged without considering the various expedients in the present operation. The smoothness with which the operation is being carried out, however, even with these makeshift facilities, and the absence of

any really serious operating difficulty is particularly worthy of note. When it is considered that the elimination of many stops reduces the need for a conductor and opens the possibility for one-man operation, the wisdom of withholding judgment on the cost of this combined car-bus service becomes obvious. Operation of single cars with one man would reduce the headway between express units in comparison with present two car trains and would thereby make more convenient the transfer from local buses.

It is fitting that this experiment is being conducted in the motor city from which issue the millions of automobiles that create present day traffic congestion throughout the country. The plan of operating surface cars express is worthy of attention both by transportation men and those who represent the community point of view. Prejudice and snap judgment have no place in this consideration. Any plan which offers even a possibility of giving faster service on the one hand and of avoiding or postponing the heavy expenditures demanded by rapid transit construction, strikes directly at the very heart of the transportation and traffic problem in many American cities.

A Convincing Answer by Those Who Use the Service

THE INTERURBAN is dead—long live the interurban! This salutation by residents of Rosedale, Merriam and Shawnee, Kan., will usher in the resumption of railway service on the Hocker line scheduled for April 1. In good measure the laurels for this revival go to the people living along the Hocker line who willingly subscribed \$10,000 in order to have service re-established and a dependable transportation system a surety.

Events in the restoration of the Hocker line are worth repeating. Officially known as the Kansas City, Lawrence & Topeka Electric Railroad, this line, operating 21 miles, went into receivership in 1919. After eight years the sale of the property at public auction was ordered by Judge Pollock of the Federal Court in Kansas City, Kan., following a request for a termination of the receivership and sale of the property as scrap. In August, 1927, at the courthouse in Olathe, Kan., it was bought by the Sonken-Galamba Corporation, Kansas City, Kan., for \$28,500. Mr. Sonken expressed his intention of junking the line. Immediately, appeals to save the road were voiced by residents and property owners who from then on worked indefatigably for the restoration of railway service. Despite setbacks, delays and disappointments an agreement was finally reached with the Kansas City Public Service Company to furnish power at cost, to rent four cars and to purchase \$15,000 in bonds of the new company to be known as the Kansas City, Merriam & Shawnee Railroad.

All this took place, even though the line is paralleled by a fine brick highway on which licensed buses are operated. Apparently the experience of those people whose convenience and property value depend on adequate and reliable public transportation service, wanted the interurban badly enough to dig down into their own pockets for the money needed to restore operation. It is to be hoped that their action will result in the ultimate rehabilitation of the road and in the development of a class of service that will repay them for their public

spirit and courage. Here is a convincing answer on the part of those who use the service, to those who would have us believe that the interurban of this type has outlived its usefulness.

"Caveat Emptor" Not Part of Modern Business

WHAT is known as a buyers' market exists at present. There is no disposition to quarrel with the purchaser who seeks legitimately to take advantage of it. It is only natural that every one making purchases should seek to do so on terms favorable to him, but that is not the end in itself. Price is important, but price alone is not the controlling factor, or should not be. Other factors are equally important, because they themselves constitute the value for which the price is paid. The chief concern of the buyer should be to see that he obtains a value proportionate with the price. The chief concern of the seller should be to see that he obtains a price commensurate with the value. Railway men are big buyers. They know that under a fixed fare the service rendered tends to approximate the limits which that fare imposes. They should know that it is equally as poor business for them to be a party to a transaction in which either side is going to lose money as it is for the public or its representatives to be a party to inflicting an inadequate fare on the railway.

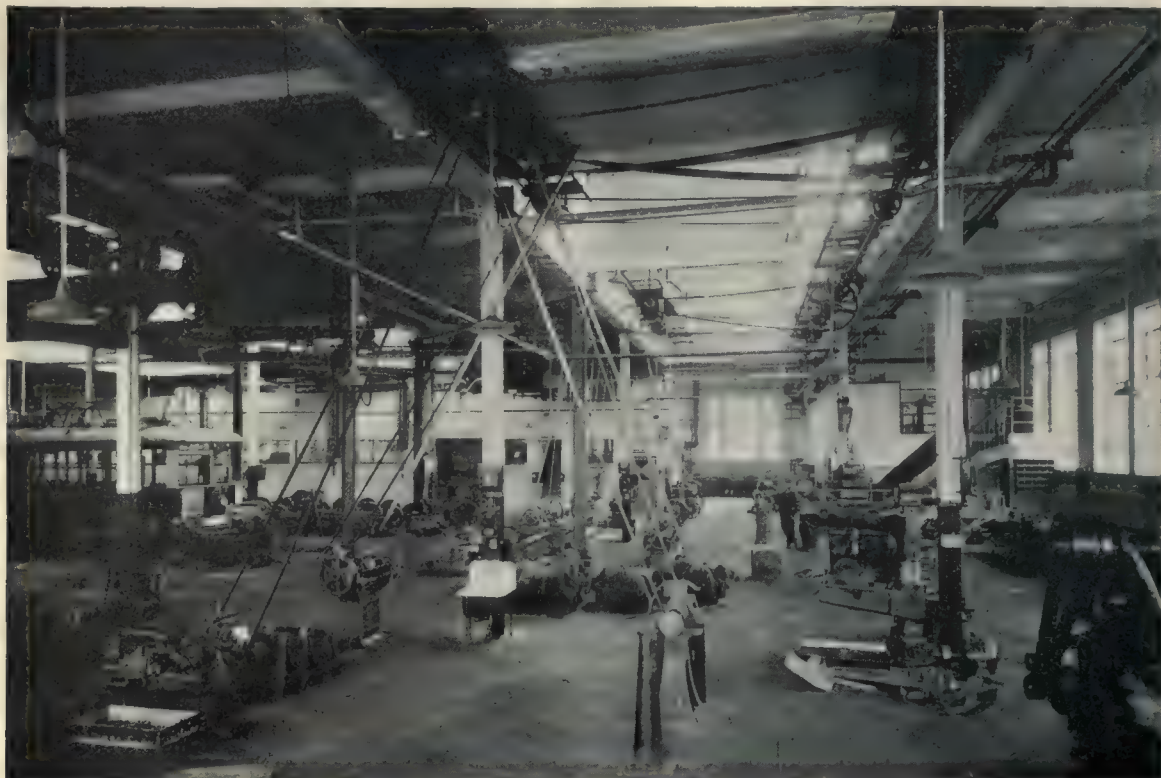
Samuel Insull, as quoted by Earl Whitehorne in his recent article in the *ELECTRIC RAILWAY JOURNAL*, put the matter succinctly in talking to electrical men about purchases when he said that if competition is so keen as to hamper research work and threaten the quality or the rate of development; if margins that are too narrow restrict the wholesaler's ability to carry adequate stocks, supply sales service and extend credit to the retailer the purchaser suffers no less than the seller. And if the policy is carried too far the seller is virtually ruined or forced out of business. It is a complex economic problem that would at first appear not to admit of the entrance of the issue of ethics. But an ethical issue is involved. The pressure that can be brought to bear on the seller is, of course, very great. Some are in a position to resist it stoutly, but others are not so fortunately situated. The secret bid is, of course, one of the greatest hindrances to the correction of present-day abuses. Three recommendations made for reform follow:

1. That bids on standard listed apparatus should be offered for examination by any bidder who is called back and asked for a reduction of his price.

2. That salesmen should demand this as evidence of good faith on the part of the buyer whenever asked to cut a price after bids are in.

3. That post mortems on competitive bids should be made standard practice among all manufacturers so that losers may understand their lost business.

As the advanced thought of the day sees it the seller should not be made to fight for this reform unaided. Purchasing agents individually and as nationally organized should also become the exponents of this idea. It is another step to be taken in the banishing of trickery from trade. In other words, in this era of economic intelligence the gentle art of profiteering by purchasers should be laid away in shrouds along with the wooden nutmeg and that once popular commercial slogan—*caveat emptor*.



Machine shop, looking from the blacksmith shop toward the stores department



Overhauling and machine shop, looking from the transfer table



View of the woodworking shop from the transfer table



Paint shop, looking from the transfer table

New Repair Shop at Quebec

A main shop building and a carhouse were constructed. Additions provide a boiler room, general storeroom and lumber storage. Interior transfer tables not affected by extreme winter conditions

DIVERSITY of equipment operated was an important factor considered in laying out the new repair shop of the Quebec Railway, Light, Heat & Power Company at Limoilou near the mouth of the St. Charles River. This company supplies all the electric power and gas used in the vicinity of Quebec and operates the city tramway system as well as a 25-mile suburban line to the shrine of St. Anne de Beaupré. Cars for the city division include 63 double-truck and 47 single-truck passenger cars together with 16 miscellaneous cars, making a total of 116. The suburban division has the following cars:

Passenger cars, steam railway type	22
Electric suburban type motor cars	11
Electric suburban type trailer cars	5
Steam locomotives	2
Electric locomotives	4
Freight cars	142
Portable substation	1
Miscellaneous Equipment	7
Total	194

Daily freight and passenger trains of the Canadian National Railway system are operated over the com-

ities will allow the carrying out of an effective reconditioning program after which the cost of maintenance should decrease.

The buildings are of light buff-colored Citadel brick with steel sash and skylights. Roof members and supporting columns are of steel with gypsum fireproof cov-



Machine shop, looking from the armature repair department



Transfer table, looking toward the wheel shop and paint shop

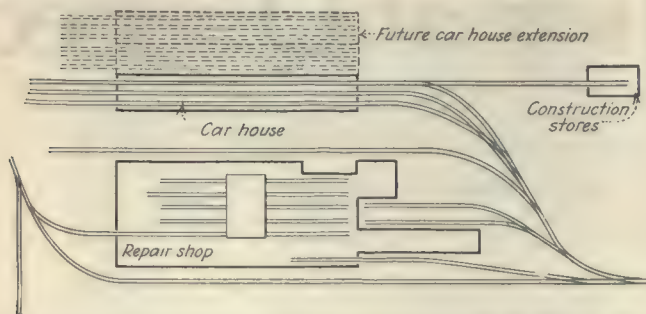
pany's tracks between Quebec and St. Joachim, which is the western terminus of the 60-mile branch line of the Canadian National Railway to Murray Bay. In addition to a large amount of local freight, the company serves two large pulp and paper companies with raw material and moves their products back to the trunk line terminals at Quebec. Steam locomotives have been superseded by electric for regular service, but two are kept in readiness for service in case of electrical breakdown.

The immediate result of the completion of the new shop was the closing down of independent repair shops on the suburban division at St. Anne de Beaupré, and at Montmorency Falls. Repair work previously carried out at the St. Malo, St. John Street and St. Paul Street shops of the city division, has been transferred to the new shop and the former are now operated as carhouses for inspection and storage. The concentration of facil-

ering. This results in a very favorable insurance rating. Floors are of concrete base with creosoted wood block surfaces. The main building is 312 ft. long and 138 ft. wide. Additions provide space for the boiler room, lumber storage, wheel stores, and general stores. The building occupied by the stores department is two stories high, the upper part being used for the lighter material and for the offices of the superintendent of equipment and general foreman. The stores for all departments of the company are now concentrated at this point.

In the design and layout of the buildings, consideration has been given to an arrangement which will allow for general extensions without altering existing plans and loss of efficiency. The shops were planned by P. J. Quinn, superintendent of equipment, co-operating with D. E. Blair, general superintendent of the Montreal Tramways. The buildings were designed and constructed under the supervision of John S. Archibald, architect, of Montreal.

Climatic conditions in winter are such that the entrances were limited to a main lead-in track feeding an interior transfer table from the north side, and a special rear entrance for long wheelbase steam locomotives in the south end of the building. This south track



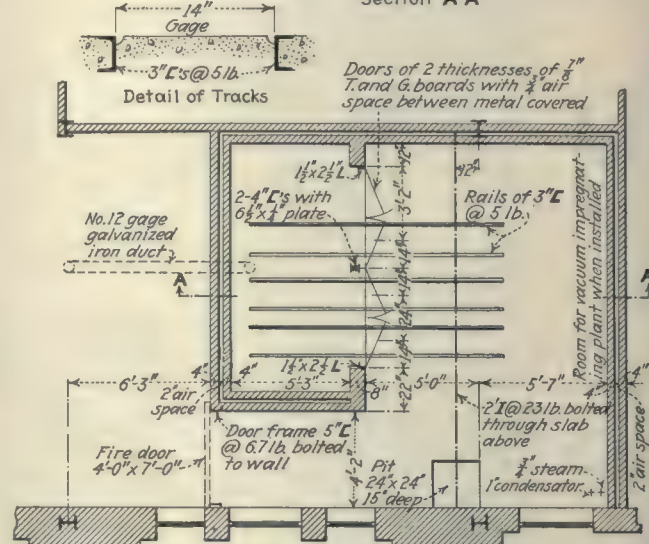
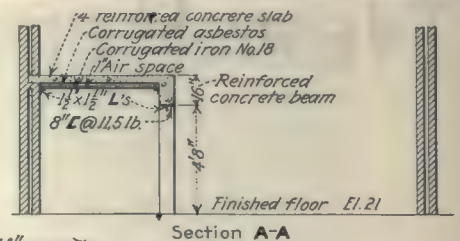
A three-track carhouse has been constructed paralleling the main shop. Ultimately it will be a nine-track building

is also used during the summer months for repairing the large number of box and freight cars used on the suburban system.

As shown on the accompanying plan, the section of the shop north of the transfer table is devoted to overhauling work and machine shop work. Four tracks, each with a pit, lead into this section from the transfer table. Two of these overhauling tracks are fitted with Columbia car hoists and provision has been made for the installation of a third when necessary. A 10,000-lb. traveling electric crane over the truck repair tracks is used for dismantling and handling the heavy electric locomotive equipment. The runways of this crane can be extended as required. Jib cranes serve the motor overhauling tracks and benches as well as the two heavy lathes in the machine shop.

The machine shop is well equipped to carry out the kinds of railway repairs necessary. A list of the various machine tools is given on the accompanying plan. Space has been reserved for the installation of a planer and some other machine tools as these become necessary for economical operation. Machine tools that are used intermittently have direct motor drive. Lathes, drill presses and other tools in constant use are driven in groups from line shafts with counter shafts.

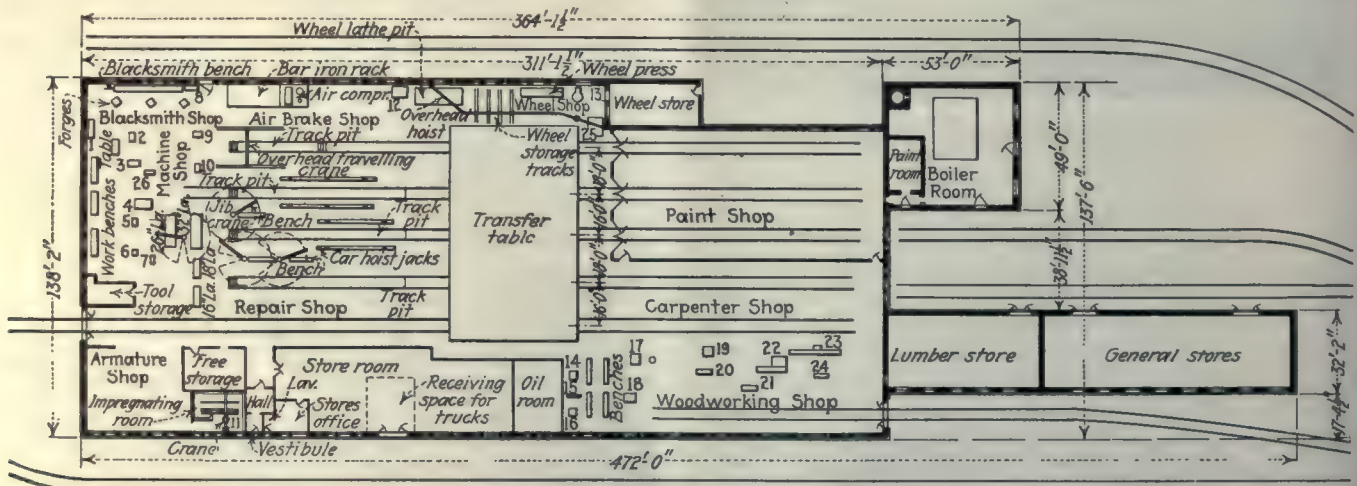
The blacksmith shop, located in the northeast corner, is equipped with Canadian Blower & Forge Company's down-draft forges. The air brake shop is along the east



Layout and details of the impregnating room

wall adjacent to the blacksmith section, and just south of this and at the end of the transfer table, is the wheel shop. This is fully equipped with a double-drive wheel turning lathe, wheel-boring machine, wheel press, axle racks and storage trucks for wheels mounted on axles. This department is so placed that wheels and axles can be handled to and from the shop and to outside stations with a minimum of labor and no interference with working tracks. The wheel storage is just south of the wheel shop.

The northwest corner of the shop is taken up with the armature repairing department. This is equipped with an overhead traveler carrying an 8-in. air hoist. An im-



Floor Plan of New Quebec Shop

- | | | | |
|----------------------------|-----------------------|-------------------------------|----------------------|
| 1. Blacksmith's tool rack. | 7. Tool grinder. | 14. Knife grinder. | 21. Jointer. |
| 2. Power hammer. | 8. Babbitt tool rack. | 15. Grindstone. | 22. Surfacers. |
| 3. Radial drill. | 9. Hacksaw. | 16. Saw grinder. | 23. Crosscut saw. |
| 4. Shaper. | 10. Bolt cutter. | 17. Shaper. | 24. Ripsaw. |
| 5. 20-in. drill. | 11. Dipping pit. | 18. Bandsaw. | 25. Spare axle rack. |
| 6. Sensitive drill. | 12. Cleaning tank. | 19. Chain and H. C. mortiser. | 26. Wet grinder. |
| | 13. Wheel borer. | 20. Molder. | |

pregnating room is provided which is arranged for dipping and baking of armatures and field coils. The baking oven is heated electrically and is served by an overhead hoist and small trucks on rails, each truck having a capacity of five armatures standing vertically. Drip pans are provided beneath each truck. A free storeroom in this location provides for safe-keeping and handling of repaired equipment parts.

The woodworking mill, carpenter shop and painter's departments are located at the south end of the shop. All woodworking tools have independent motor drive. The woodworking shop is arranged so that the large quantity of lumber entering into the repairs of wooden box cars and freight cars can be handled from the lumber room through the proper machine onto the car repair track by the most direct and shortest possible route. A separate fireproof paint-mixing room is provided at one end of the paint shop.

The transfer table occupying the central position in the shop serves all departments. It has a capacity for handling 60-ton electric locomotives. Compressed air outlets have been installed throughout the shop for various purposes. These are supplied by a 100-ft. air compressor located adjacent to the air brake department.

A new carhouse just east of the general shop is 312 ft. 4 in. long and 46 ft. 4 in. wide. It has three tracks, each with a pit. This is the first bay of what will ultimately be a nine-track operating carhouse and is parallel and close to the main shop for convenience. The pits are equipped with Watson-Stillman hydraulic pit jacks supported by rails set into the concrete pit floor.

Heating of the building is partly by direct ceiling type heaters with electrically operated blowers, and partly by wall radiators placed under the windows in the main repair shops and service section.

Rapid Transit Faster Than Autos

SOME interesting figures regarding the relative time consumed by and the convenience afforded to suburban commuters in traveling to and from Chicago's Loop district by automobile, elevated train and steam railroad are given in a survey by the *Chicago Tribune*.

Taking a central point in the north side suburb of Evanston, the test showed that the Chicago & Northwestern steam line commuters accomplished the 10-mile journey to the "heart of the Loop" in 39 minutes, elevated line travelers in 45 minutes and motorists in 48 minutes. In actual riding minutes, however, the trip by elevated was thirteen minutes faster than by automobile and ten minutes slower than by the steam line express trains, as the figures were based on a five-minute walk to the elevated and steam road stations, but with no walk for the motorist. The test was made at the height of the morning rush hour. In the automobile test no attempt was made to speed. The return trip during the evening rush hour showed the elevated line commuter six minutes slower in reaching his destination than the autoist and twenty minutes slower than the steam road user, but in actual riding time he consumed about four minutes less than the motorist did.

Similar studies made of transportation service from the south side of Chicago brought out that the electrified Illinois Central Railroad service in one direction is three minutes faster for the 10-mile trip from 81st street to the Loop than the automobile and five minutes faster in the other.

Manila to Use Trolley Buses

Economy of electric operation and need for reconstructing track if street car service were continued led to their purchase

EIGHT Twin Coach trolley buses have been purchased by the Manila Electric Company, Manila, P. I., operated by the J. G. White Management Corporation, New York, N. Y., to replace the street cars on the San Juan line of the property. The need of reconstructing all track of this line and the economy of the electric operation prompted the purchase of the trolley buses in preference to rail cars or gasoline buses.

The route, shown in the accompanying map, extends on Calle Santa Mesa from the Rotonda to the bridge over



The new trolley buses on the San Juan line will feed two lines entering the central business district of Manila

the San Juan River at the city limits, and is 2.96 miles in length. Calle Santa Mesa is a narrow street and is subject to heavy traffic. Continued operation of the street cars would have required construction of double track, at a cost of approximately \$100,000.

The management of the Manila Electric Company was convinced of the practicability of operating trolley buses in the Orient by the example of the electric railway in Shanghai. This company has been operating trolley buses successfully for ten years and is planning to extend this class of service. The street railway in Singapore also is planning to use the new type of vehicle. The Shanghai installation is the more convincing since commodity costs are much lower in Shanghai than in Manila and labor costs there are only 20 to 25 per cent as much.

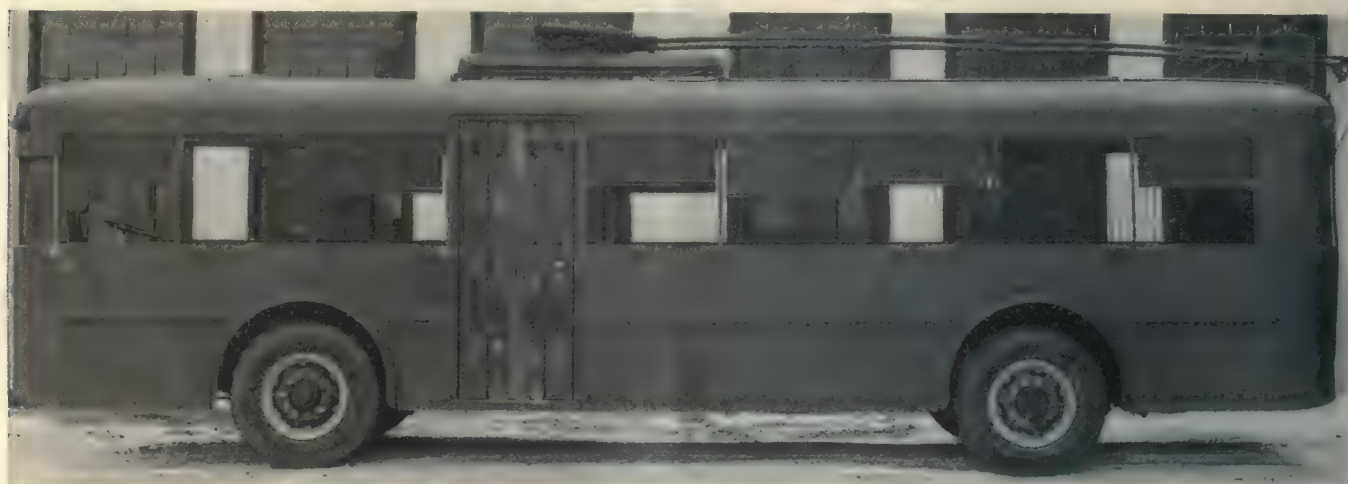
As mentioned previously, the buses will replace the street cars now operating on the San Juan line and will feed two trolley lines routed from the Rotonda to the heart of the city. Six buses will be used on regular schedules while two will be retained as extras. A headway of ten minutes will be maintained throughout a sixteen-hour day with a reduction to 3½ minutes during rush hours. To give this service it is estimated that 196,100 bus-miles will be operated annually. An average speed of 8.88 m.p.h. will be maintained over the route.

Considering both operating costs and fixed charges trolley buses were considered to offer the least expensive type of vehicle, figures being on a vehicle-mile basis. The cost of operating rail cars was found to be 29.6 per cent and the gasoline buses 36.4 per cent greater than the trolley buses. The high cost of gasoline in the Philippine Islands makes the gasoline buses very expensive. The comparative costs as computed on a vehicle-mile basis for the street car and the trolley bus are given in the accompanying table.

COMPARATIVE OPERATING COSTS OF STREET CARS AND TROLLEY BUSES, COMPUTED ON A VEHICLE-MILE BASIS

	Street Car	Trolley Bus
Way and structures.....	\$0.0170	\$0.0085
Equipment.....	0.0170	0.0360
Power.....	0.0255	0.0176
Conducting transportation.....	0.0600	0.0600
Traffic.....	0.0019	0.0019
General and miscellaneous.....	0.0290	0.0290
Totals.....	\$0.1504	\$0.1530

to 600 volts. Cartridge fuses inclosed in a metal box are provided in each side of the line to protect the motors from severe overloads and short circuits. The controller is operated by a pedal and spring arrangement which permits the operator to use both hands for steering the bus. The master controller handles only the small current used to actuate the contactors which in turn handle the motor current. The master controller has seven positions, with seven corresponding contactor combinations. The rotation of the motor is reversed by a G.E. DH-69 reverse switch, hand operated.



One of the Twin Coach trolley buses assembled but not painted. A separate base and trolley pole are provided for each overhead conductor

Fixed charges, including interest, taxes and depreciation, respectively total 14.6 per cent and 16.3 per cent of the street car and trolley bus investments. Including \$100,000 for track work and approximately \$20,000 for paving charges the sum required to continue street cars was found to be \$215,700, as against \$104,350, including a \$10,000 paving charge, the cost of starting trolley bus operation.

Considering both operating costs and fixed charges the comparative figures on a vehicle-mile basis are \$0.311 and \$0.240, for the street car and trolley bus, respectively. The actual saving was estimated to be \$14,000 per year.

The buses, manufactured by the Twin Coach Corporation, Kent, Ohio, use the single-deck street car type Twin Coach chassis and body with a seating capacity of 40. Electric motors replace the engines of the standard automotive unit. The bodies are designed for two-man operation with an entrance on the left side ahead of the center.

All electrical equipment for the buses was furnished by the General Electric Company. Two 600-volt G.E. 1126-A railway motors are used and a G.E. C-154 master controller. The controller is similar in construction to the usual street car controller, but much smaller. It is of the series-parallel type, having four steps series and three steps parallel, and will operate over a range of 300

A complete trolley base and pole is provided for each of the two overhead conductors. The poles have swivel harps and at moderate speeds the bus can diverge from 8 to 9 ft. from its regular course. The trolley poles are of sufficient length to accommodate overhead ranging from 16 to 22 ft. above the street.

The motor circuit resistors are iron grids insulated from their support and one another by mica. They are mounted under the bus body with supplemental insulation between the resistor frames and the floor. Cables for the motor control and lighting circuits have one layer of tape and one layer of compound-filled braid over the rubber. A switch connected to the emergency brake handle automatically cuts off power from the motor when the emergency brakes, which act on drums anchored integrally to each electric motor, are set.

The lighting system consists of twenty 30-watt, 30-volt lamps in series. The bus interior is illuminated by ten dome fixtures.

A test of one of the completed buses was conducted near the Twin Coach plant in Kent, Ohio, on Jan. 31, under the supervision of the factory officials and F. L. Aime of the J. G. White Management Corporation. D. C. Green, vice-president Utah Light & Traction Company, Salt Lake City, Utah, and Edward A. West, general manager of the same company also attended the test.

North Shore Line Uses Combination Trolley and Battery Locomotives

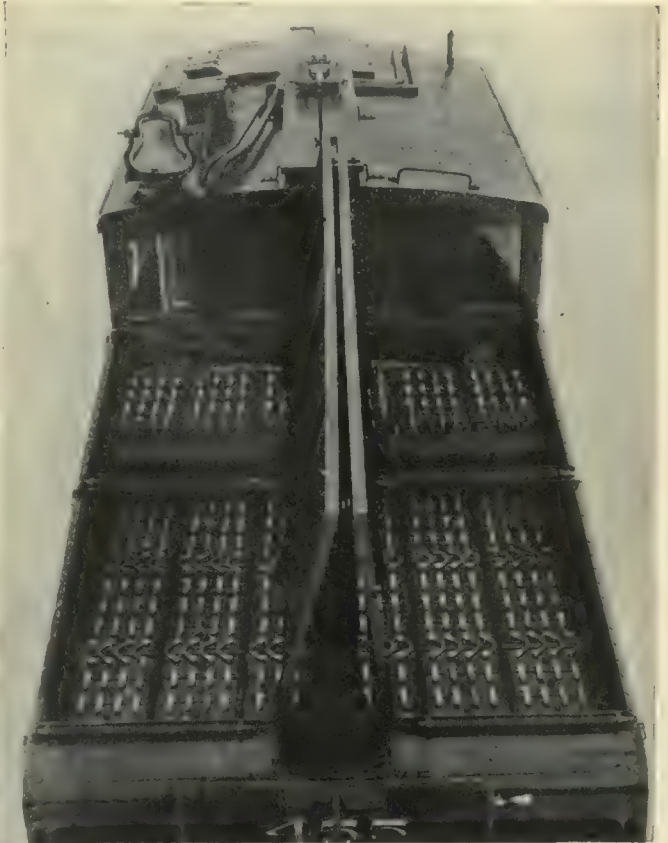
By F. H. Brehob

Railway Engineering Department, General Electric Company

TWO combination trolley and battery locomotives of a new type have just been placed in service by the Chicago, North Shore & Milwaukee Railroad. Provision is made for charging the battery from the trolley supply when necessary. The locomotive is thus available for use both on the trolley system and on tracks not so equipped.

Each of the two-axle swivel equalized trucks has a cast-steel transom and built-up side frames, rigidly bolted together. The journals are of the A.R.A. collar type, size 6 in. x 11 in. Brake cylinders are mounted directly on the trucks, eliminating brake rigging from underneath the platform.

The steeple-type cab has a control station at each end of the central compartment with the control equipment in the middle. The battery is located in the two sloping end cabs and is divided equally between them. The battery cells are in a single tier, permitting convenient access for the addition of water. Holes cut in the floor underneath the trays provide for ventilation of the batteries, permitting the heat to escape through ventilators built into the battery compartment covers. The cab rests on a platform with structural steel framing, riveted and



Trolley-battery locomotive—70 tons, 600 volts. The top view shows the battery in place

braced to the floor plate. Spring draft gear is attached to the center sills of the platform.

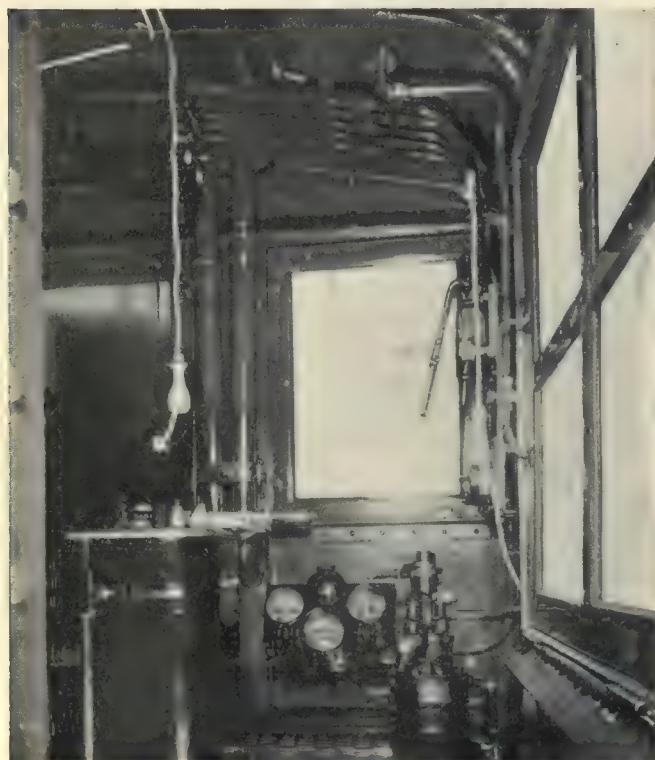
Four GE-251 single-gear, commutating pole, box-frame type motors are suspended on the axles and truck transoms. Each motor has a continuous rating of 4,250 lb. tractive effort, using a 69-tooth gear and a 17-tooth

pinion. The motors are ventilated by an electrically driven blower in the central cab, with an intake drawing the air from the outside and discharging it to the motors through a duct built into the platform. Smaller ducts with sliding flanges distribute the air to the traction motors through the top of the magnet frame.

The control equipment is type M, multiple unit, with a master controller at each operating position. The main power contactors are actuated magnetically and the motor reverser is electro-pneumatic. Three-speed control is provided from either trolley or battery power. Transfer from trolley to battery power is automatic. A relay actuates the transfer contactors. In order to restore trolley power, however, it is necessary to move the master controller to the first notch.

Besides the air pressure gages, an ammeter at each operating position indicates the current flowing through one motor. There is also an ampere-hour meter in the battery circuit to indicate the state of charge of the battery.

Electric heaters of the sheathed wire type are located



View of operator's position

near the operating positions connected in the trolley circuit only. Power for operating the control and lights is supplied by the battery at all times. One sixteen-point coupler socket at each end of the locomotive permits use of two locomotives in multiple unit. Neither battery nor trolley are bussed through so that each locomotive receives its own power for traction purposes.

An Exide Ironclad battery is used, consisting of 192 cells, type MVA-41, furnished by the Electric Storage Battery Company. The battery is grounded at the mid-point. This reduces the voltage stress to ground to one-half battery voltage or about 225 volts. A switch breaks the battery into two sections, ungrounded, making it safe for maintenance and the addition of water.

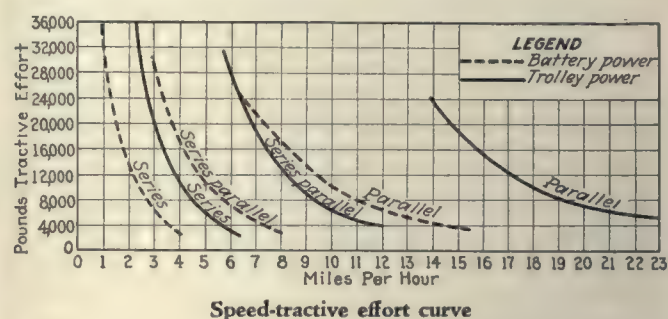
A 25-kw. motor-generator set is located in the main cab. Its control is automatic by the use of a contact in the ampere-hour meter. When the battery becomes fully charged, this contact automatically causes the motor-generator set to be shut down. When the battery becomes about 15 per cent discharged again, the set is started automatically. If, while the motor-generator set is running, the locomotive leaves the electrified line, the

WEIGHTS		DIMENSIONS	
Electrical equipment.....	68,000 lb.	Height over cab.....	12 ft. 1 in.
Air brake and compressor...	5,000 lb.	Width of main cab....	9 ft. 8 in.
Mechanical portion.....	67,000 lb.	Length of main cab....	11 ft. 6 in.
		Width of auxiliary cab...	9 ft. 8 in.
Total, all on drivers.....	140,000 lb.	Lgth of auxiliary cab...	11 ft. 6 in.
Per driving axle.....	35,000 lb.	Lgth between knuckles...	40 ft. 0 in.
Minimum radius of curvature, locomotive alone....	50 ft.	Rigid wheelbase.....	7 ft. 2 in.
Maximum speed.....	40 m.p.h.	Total wheelbase.....	28 ft. 8 in.
		Diameter of wheels....	36 in.
BATTERY CHARACTERISTICS			
Ampere-hour capacity at six-hour rate.....	680		
Average volts at six-hour rate.....	380		
Kilowatt-hour capacity at six-hour rate.....	258		
Maximum discharge rate in amperes.....	3,000		
Maximum kilowatt discharge rate.....	600		
Approximate weight of battery, pounds.....	30,000		

set will shut down, and it will start again upon the return of trolley power without attention from the operator.

Westinghouse 14-EL partial schedule straight and automatic air brake equipment is furnished. The leverage is so proportioned to give 75 per cent braking with 50 lb. cylinder pressure. Two General Electric CP-30 air compressors have a rated capacity of 35 cu.ft. per minute each. A hand brake operated from the main cab has sufficient power to hold the locomotive at a standstill on a grade.

The accompanying speed-tractive effort curve shows the operating characteristics. The one-hour rating is



22,000 lb. at 14 m.p.h. and the continuous rating is 17,000 lb. at 15 m.p.h. when operating from a 600-volt trolley.

The accompanying tabulation gives the principal data for this locomotive.

Milwaukee Issues Attractive Route Guide

DISTRIBUTION of a new street railway and motor bus guide is now being made to the public of Milwaukee by the Milwaukee Electric Railway & Light Company. An edition of 300,000 was printed. The guide is an attractive sheet, 12x18 in., folded in time-table form, having on one side a map of the city showing all street car and motor bus routes. The other side has an index of Milwaukee streets, list of places of interest in the city reached by street car and motor bus and a small map of the interurban system of the company, which covers southeastern Wisconsin by both rail and bus lines.

Early this year Milwaukee underwent quite a street name changing program so that the map and street guide is particularly welcome at this time. The maps are being given out on the street cars, at the information desk in the Public Service Building, at several bus and railway stations and at the company's ticket office. Copies have also been distributed to information bureaus, travel bureaus, hotels and newspapers. The maps are being advertised on dash signs and interior car cards.

Inert Gas Protects Bus Fuel

in Paris

An inert gas, largely nitrogen, is kept in contact with the surface of stored fuel both in the main fuel supply station and in the various operating garages

By **Henry W. Blake**
Senior Editor "Electric Railway Journal"



Place de la Concorde, Paris, looking north. This is a busy traffic center. Two buses are shown loading at the right. Near the foreground is a double electric railway track which crosses the place here on an avenue known as the Quai des Tuileries

IN ALL fuel reservoirs of the Paris tramway and bus system an inert gas is kept in contact with the fluid to reduce the danger of accidental combustion. This plan is followed both in the main receiving reservoirs and in those of the various operating garages where the buses are charged with fuel.

As mentioned in a previous article in this paper, the fuel used for buses in Paris is a mixture of gasoline, alcohol and kerosene. Most of this material is received in Paris by rail over the Nord Railway, one of the main steam railroad lines of France. A switch track from this railroad leads into the main fuel storage yard of the S.T.C.R.P., the initials of the company operating the street railways and buses in Paris. There are also branch tracks into this storage yard from the electric railway system. The railroad tank cars holding the fuel

discharge their loads directly into the company's storage reservoirs, which have an aggregate capacity of about 1,600,000 liters (445,000 gal.) or a supply for about three weeks. This large capacity is provided to avoid interruptions to the service if delay occurs in the receipt of fuel. From these storage reservoirs the fuel is distributed each day to the different garages by means of tank trucks with a capacity of from 4,000 to 5,000 liters (1,000 to 1,300 gal.) each. While in storage, the fuel is kept from the air by the use of inert gas, according to the Rolland and Maurice system.

Under this system the greater amount of the inert gas is used indefinitely, additions to it being necessary only to compensate for small losses which occur from various causes. The general arrangement at the main storage reservoir is shown in Fig. 1. The arrangement consists

essentially of a group of tanks, *R*, and a compressor, *C*, which is operated by an electric motor, *D*, which, in turn is controlled by an automatic switch, *E*.

When a railroad tank car arrives to discharge its contents, as shown at *V*, the air pump, *C*, is put in operation, exhausting the inert gas contained in the tank, *R*, through the piping, 5, and storing it in the accumulator, *A*. The amount of inert gas taken out is equivalent in volume under atmospheric pressure to the amount of fuel in volume admitted into the tank reservoir. When the tank car has discharged its contents no air is allowed to enter the system, as the receiving pipe is automatically shut off by a valve which is located on piping system No. 1.

To transfer fuel from the underground tank to the

four tanks, and each of the others consists of three tanks. Each group has a storage inlet and a discharge outlet.

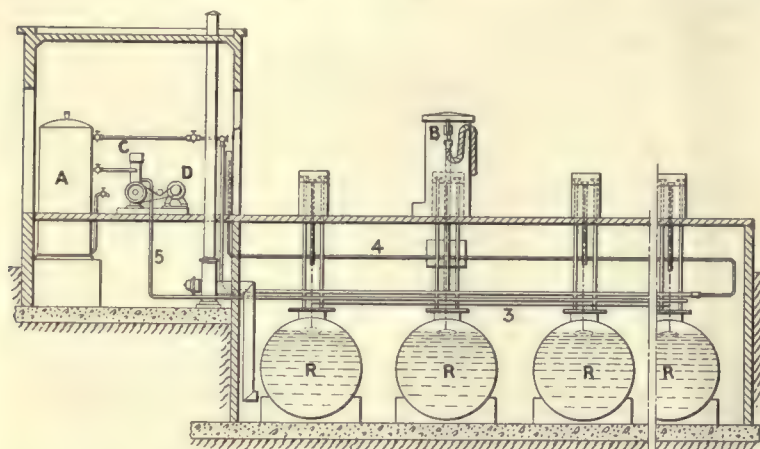
There are five piping systems leading to each tank, and each piping system is fitted with a cut-off valve at the dome of each tank. These piping systems are numbered in the drawing as follows:

1 is the piping through which fuel is admitted into the reservoirs. It is connected with the storing inlet.

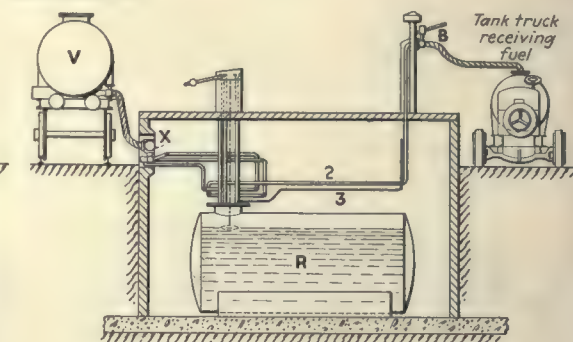
2 is the piping through which fuel is taken from the reservoirs. It is connected with the discharge outlet.

3 is known as the safety piping. It is of lead and connects with the piping of the discharge system, as will be explained later.

4 is the piping for admitting the inert gas from the



R.R. Tank car discharging fuel



Tank truck receiving fuel

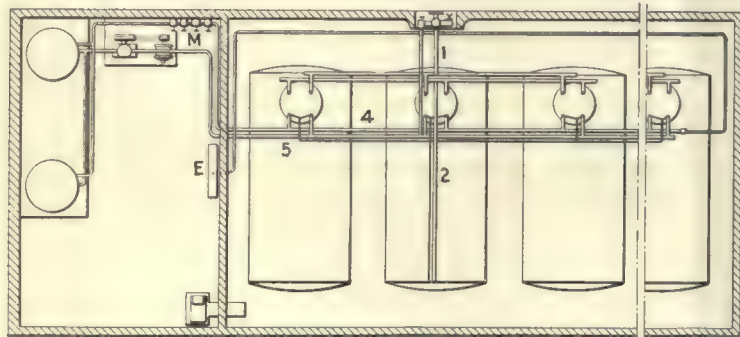


Fig. 1—Plan and sections of fuel reservoirs, inert gas accumulator, piping, etc.

LIST OF EQUIPMENT

A = inert gas accumulator
B = safety cock
C = electrically driven compressor
D = electric motor
E = automatic electric control switch
M = pressure regulator
R = fuel reservoirs
V = railroad tank car
X = three-way valve

LIST OF PIPING

1 = piping for leading fuel from railroad tank car to main reservoirs
2 = piping for discharging fuel from main reservoirs to tank truck
3 = safety piping
4 = piping for admitting inert gas from gas accumulator to fuel reservoirs
5 = piping for exhausting inert gas from fuel reservoirs

tank wagon the inert gas in the accumulator, *A*, is admitted under pressure to one of the reservoirs *R* through a pressure regulator, *M*. The fuel then passes up through pipe 2 and flows out by cock *B*.

In the main storage yard there are 22 tanks, each of 65 cu.m. (about 20,000 gal.) capacity. Each has a diameter of 3.15 m. (10 ft. 4 in.) and a length of 8.50 m. (27 ft. 10 in.). They rest on supports in a large pit, which has a concrete floor. These reservoir tanks are arranged in seven groups. One of these groups includes

accumulator to the reservoir tanks, *R*. 5 is the piping for removing the inert gas from the reservoir, *R*. At its outer end this piping is connected to the exhaust of the air pump.

All of the cut-off valves mentioned are operated by handwheels located in boxes on the surface of the ground. Each box also contains a gage to indicate the pressure in the tank, and another to give the volume of the liquid contained in it.

METHOD OF FILLING RESERVOIRS

On the surface also are the filling inlets, a three-way cock which controls the movement of the inert gas and a safety device to prevent the entry of air into the reservoir when the tank car has finished discharging its contents into the reservoirs. This device, shown in section in Fig. 2, contains a float which lifts a valve when it is completely submerged and permits the liquid to pass through. As soon as the flow ceases a spring draws the valve back on its seat and closes the pipe.

FILLING STATION FOR THE MOTOR TRUCKS

A feature of the equipment for discharging the fuel from the underground reservoirs into the tank trucks is a safety cock, which is designed to avoid any spilling of the fuel if any of the pipes should break. The location is shown at *B* in Fig. 1, shown above, and in detail in Fig. 3, which is a vertical section of this device. In the latter drawing the fuel, discharging from the underground reservoir into the tank truck, flows in the pipe *a*, through the valve *D* into the pipe *a'*. The valve, *D*, is controlled by a piston, *B*, which has an opening, *G*. When the valve, *D*, is closed and the outlet is not in use, this opening, *G*, connects pipe *b* with pipe *b'*. All the

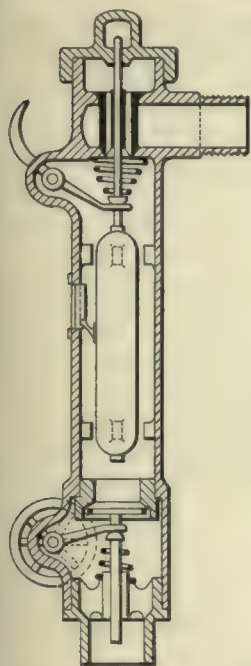


Fig. 2 — Safety cut-off on receiving piping

outlet cocks are arranged in series so that the tube *b* in one connects with the tube *b'* in the preceding cock and so on to the first cock, whose tube *b* is tapped in to the dome of its main reservoir *R*, in Fig. 1. The tube *b'* in the last cock in the series is connected with the end of the fuel piping 2 before it reaches the cut-off valve. The result is that when all the cocks are closed all the liquid in pipe 2 at each outlet exhausts immediately into reservoir *R*.

Piping 3 is in parallel with piping 2. It is of lead and is installed so that if a rupture occurs it will take place in the lead pipe rather than in piping 2, which is of steel.

ENGINE ROOM

At the western end of the fuel storage plant is the engine room, which contains ten inert gas accumulators, shown in elevation at *A* in Fig. 1. Each of these accumulators measures about 23 ft. long

and 4 ft. in diameter and is fitted with a safety valve. In these accumulators the inert gas can be compressed to about five atmospheres. Adjoining the accumulators is a compressor with its electric motor. There is also the automatic electric control switch, already mentioned and shown at *E* in Fig. 1. Its function is to bring back the pressure in the fuel reservoirs to atmospheric pressure after the pressure has been increased for the purpose of discharging fuel.

Finally, in the engine room there is a blower for ventilating the pit in which the fuel reservoirs are contained. The air from this blower escapes from the pit through four outlets. There is a passageway between the engine room and a pit containing the fuel reservoirs.

The entire property is inclosed on all sides by a wall 11 ft. high and 9 in. thick.

RAILWAY CONNECTIONS

Two tracks, connecting at one point with the Nord Railway and at another point with the tramway system, permit the entrance of tank cars and provide for their removal after their contents have been discharged.

The rules in force forbid the movement of these cars while within the grounds by either steam or electric tractors. Instead, they are moved by cable. This is

accomplished by means of two electrically operated capstans which are located on each side of the depot but outside of it. The apparatus for producing the inert gas is located outside of the main warehouse as shown in the plan of the property. The generating plant consists of an ordinary two-cylinder gas engine driving a compressor used to force the inert gas produced into the accumulators. A second gas engine adjoins the other for use in case its services should be needed.

The exhaust from the gasoline engine operating the compressor, when it is running in normal operation, has been found by chemical analysis to consist of 85 per cent nitrogen, 13 per cent CO_2 and 2 per cent CO . The proportion of free oxygen contained in this mixture is so very small that it is practically negligible and the gas so obtained has been found absolutely inert when care is taken to keep the operation of the motor normal. The care thus required is to avoid in the exhaust either an excess of air, which would increase the proportion of oxygen, or an excess of gasoline, which would increase the proportion of CO . This is the inert gas, after it has been purified, which is used to be in contact with the fuel in the fuel reservoirs, and piping.

PROCESS OF PURIFYING THE GAS

The method of purifying the gas is shown in Fig. 5. After leaving the motor the exhaust gas first passes into the cleanser, *D*. Here it passes through water and in cooling leaves behind the greater part of any water vapor it may have contained. It then passes through the pipe *d* to the compressor *C*, which forces it through the pipe *g* into the second cleanser, *G*. This cleanser is similar in construction to cleanser *D*. Here it leaves the last traces of its water vapor. Then it passes through a filter, *H*,

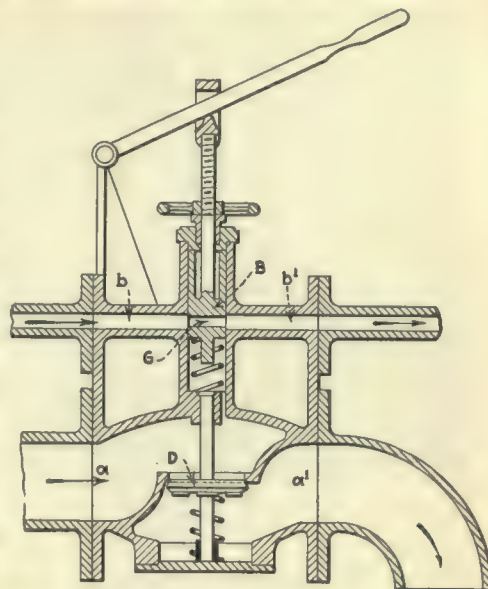


Fig. 3 — Safety cut-off on discharge piping

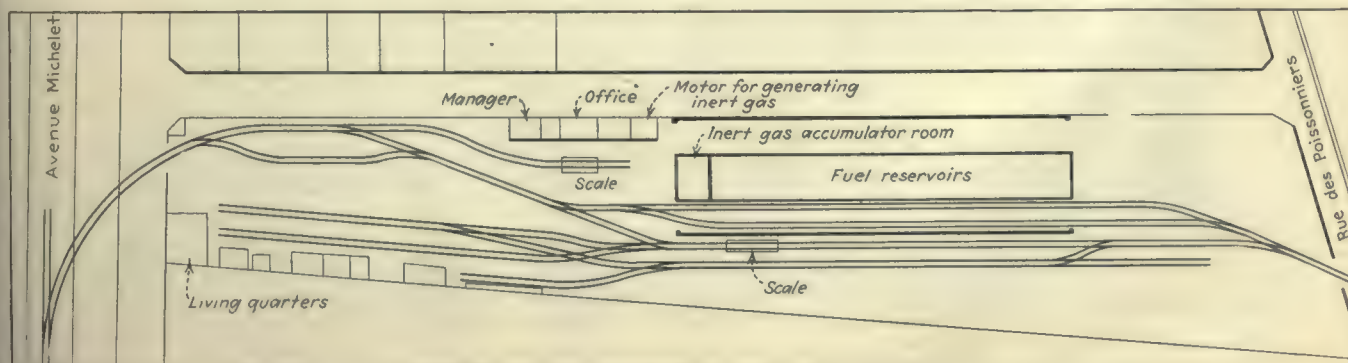


Fig. 4 — Plan of central storage area showing position of buildings and switch tracks

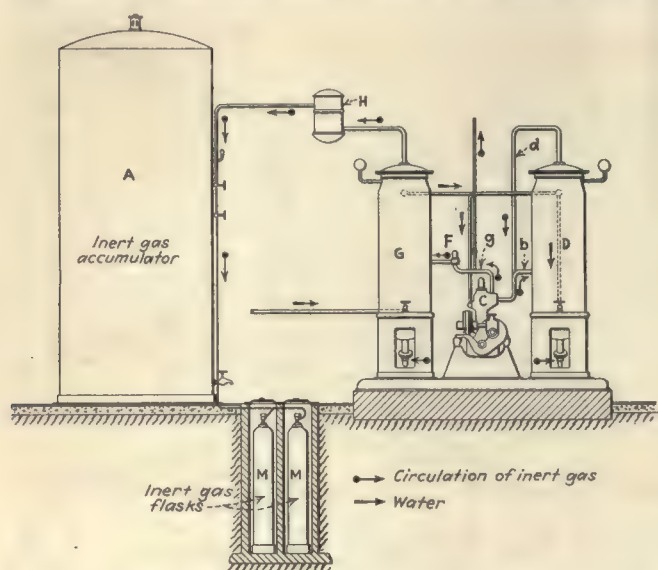


Fig. 5—Vertical elevation of inert gas pump, cleansers and accumulator

into the main gas accumulator, or it can be stored in smaller receptacles at *M*.

Between the force pump and the cleanser *G* is an automatic pressure regulator, *F*, by which the work imposed on the compressor is kept constant. The purpose of this regulator is to provide that in the event of two consecutive failures of ignition in the driving motor there will be no danger that a mixture containing any inflammable gas will pass over into the inert gas accumulator. Should there be such an ignition failure, the power of the motor falls off and it is unable to overcome the resistance provided through the pressure regulator; hence, the motor stops. This action is made more certain by the use on the motor of a very light flywheel. Finally, a cut-out on the motor exhaust pipe allows the motor to discharge its exhaust into the atmosphere for a short time after it has started running. In this way

the cylinders are cleared of any air or unburned fuel before the exhaust is led to the inert gas accumulator.

At the plant described 25,000 tons of liquid fuel are passed in and out each year.

INERT GAS SUPPLY AT LOCAL GARAGES ALSO

The same system of fuel protection by inert gas is used in the local garages as in the main storage supply, although the equipment is not as complex or extensive as that at the central storage plant. But it is as complete so far as protection from accidental combustion is concerned.

The plan of the S.T.C.R.P. Montrouge garage, Fig. 6, shows a typical Paris garage layout. This garage has a total area of 70,203 sq.ft. and a covered area of 56,484 sq.ft. Its maximum capacity is 108 standard buses and its normal operating capacity is 104 buses. In one corner, as will be noticed, are the living quarters of the depot superintendent and his two assistants. This is a feature of all of the omnibus garages in Paris. In this case the housing quarters contain offices on the ground floor and living quarters for a family on each of the three stories above the ground floor.

Glasgow Adopts Double-truck Tramcars

This Scottish city has purchased for its municipal system 50 cars involving many changes from standard British design. Experimental changes are also being made on six of the older cars

FIFTY new type tramcars are soon to be installed by the Glasgow Tramways, Glasgow, Scotland. At the annual inspection of the corporation's car works by the Tramways Committee on Oct. 13 samples of the new type car, as well as several types of reconditioned cars, were examined. In all of these the objects aimed at are greater speed and greater comfort for the passengers in order to meet bus competition.

The lower deck of the new car is finished in teakwood, the ceiling covered with embossed paper and painted white. This deck seats 30 passengers. Twelve are cared for by six cross seats in the center, three on each side of the aisle. Sixteen passengers are seated in the longitudinal seats at each end. The body width externally has been increased by 5 in., but by introducing a specially reinforced side pillar the inside width of this deck is increased 9 in.

The upper deck is also finished in teakwood, the ceiling covered with ply-wood and painted white. The top deck is completely inclosed. A partition and folding doors are fitted around the stairhead to prevent draughts passing through. All seats face forward except four, where the passengers sit with their backs to the staircase. Two single seats in the center permit passengers to pass each other in comfort. Ten lamps of 40 cp. each are fitted in the upper saloon and eight in the lower.

The body is mounted on two bogies of the maximum traction type, thus departing radically from the former Glasgow standard four-wheeled car. The driving wheels have a diameter of 27 in. and the pony wheels 22 in. The wheelbase of the body is 4 ft. 2 in. and the distance between bogie centers 13 ft. 6 in. Each of the 50 new

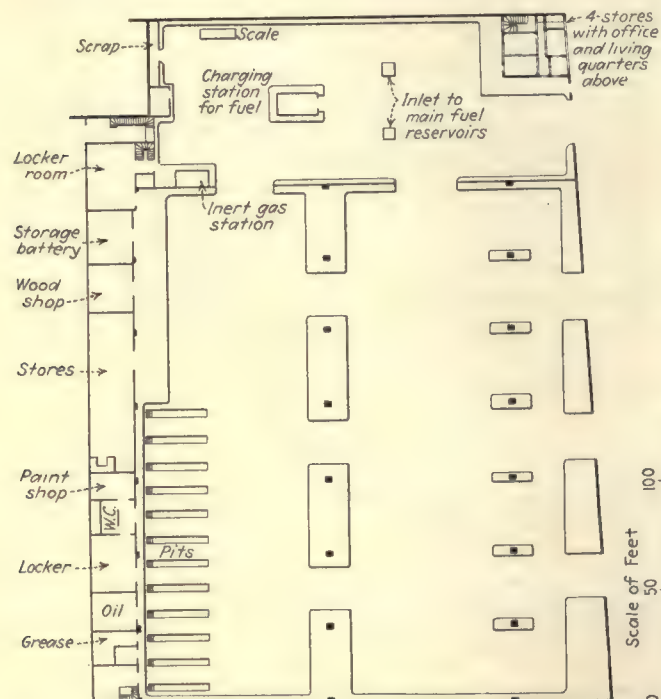


Fig. 6—Plan of Montrouge garage, Paris, with accommodations for 108 buses maximum and 104 buses normal. Like all other garages of the S.T.C.R.P., this one has an inert gas outfit for protecting the fuel supply from accidental combustion



The upper decks of the Glasgow cars are entirely inclosed.
This is also an innovation in British design



By careful design the lower deck of the new Glasgow tramcar has an interior 9 in. wider than in the previous cars

cars has two 50-hp. light-weight ventilated motors with contactor controllers.

The car is equipped with hand, air and electro-magnetic brakes. The air brake, which operates the hand brake gear, relieving the motorman of the physical strain of braking by hand, will be used exclusively for service

New Car		Old Car	
20 ft. 6 in.	Length of body.....	17 ft. 0 in.	
6 ft. 0 in.	Length of platform.....	6 ft. 0 in.	
33 ft. 0 in.	Length over platform angles.....	29 ft. 6 in.	
7 ft. 2 in.	Width of body over panels.....	6 ft. 9 in.	
7 ft. 3 in.	Width of body over molding.....	6 ft. 10 in.	
6 ft. 10 in.	Width inside lower saloon.....	6 ft. 1 in.	
6 ft. 10½ in.	Width inside upper saloon.....	6 ft. 8 in.	
6 ft. 3 in.	Height of lower saloon.....	6 ft. 4½ in.	
6 ft. 0 in.	Height of upper saloon.....	6 ft. 1½ in.	
2 ft. 7 in.	Height of car floor from rail.....	2 ft. 8 in.	
15 ft. 10½ in.	Height over all from rail.....	16 ft. 2½ in.	
30	seats, lower saloon.....	24	
38	seats, upper saloon.....	38	
68	Total seats.....	62	

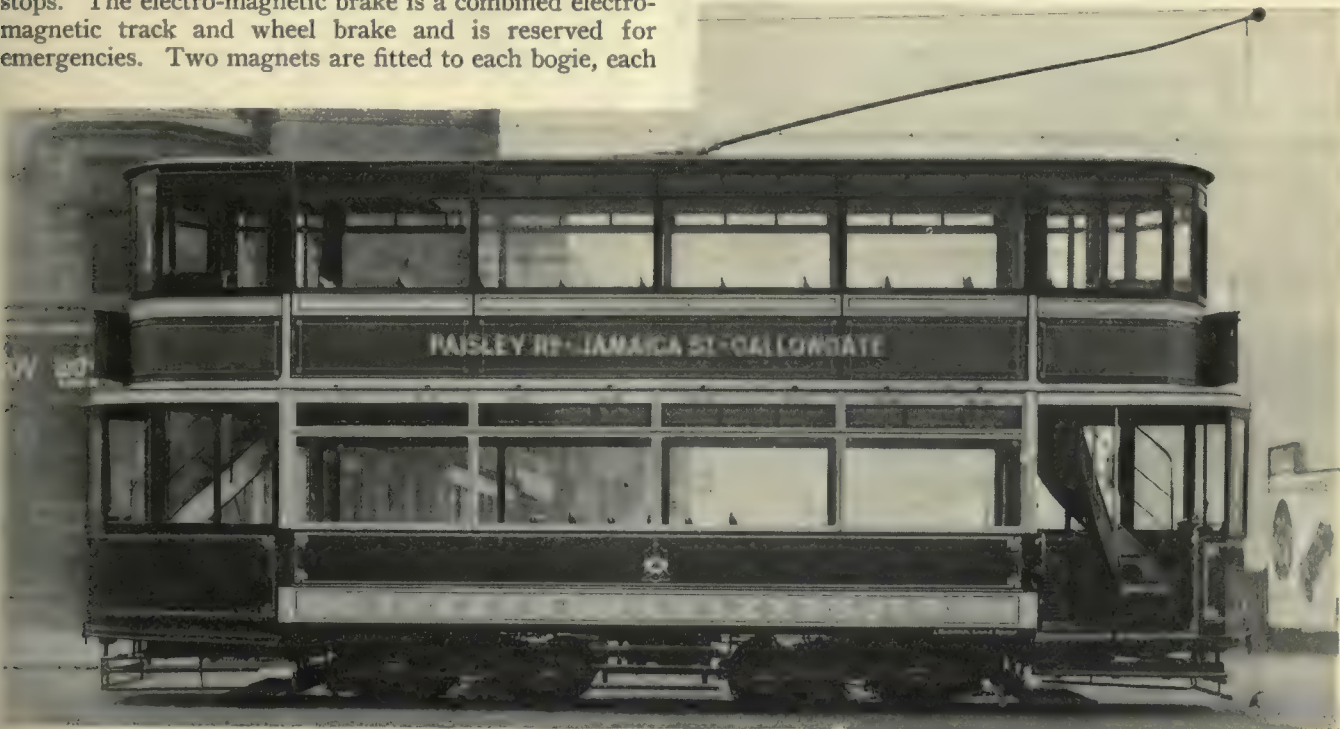
being capable of exerting a vertical pull on the rails of 2 tons. On each platform there is installed a simple cock which will set the air brake when opened. By this means the brakes can be set and the car stopped, either by conductor or passenger. On the driver's air brake handle is a trigger which opens an air-valve when depressed and forces sand under the wheels.

The combined destination and route indicator is mounted over the lower canopy, the destination letters being 5½ in. deep and the route letters 4½ in. deep. Under the top canopy the route number is shown in figures 6½ in. deep. This is a distinct advance on the present type of destination indicator.

Exterior and interior views of the car are shown in the accompanying illustrations.

The principal dimensions of the new car compared with the former standards are given in the accompanying table.

stops. The electro-magnetic brake is a combined electro-magnetic track and wheel brake and is reserved for emergencies. Two magnets are fitted to each bogie, each



The first of 50 new cars for the Glasgow, Scotland, municipal tramway.
These are the first double-truck cars to be used on the property

Car Tickets at One-Third Off

Discount allowed by Atlanta grocery store to customers who return bread wrappers—
Tickets also sold through druggists

HOUSEHOLDERS in Atlanta are being offered a novel inducement to purchase loaves of bread made by the Southern Grocery Company. This organization owns 150 grocery stores, known as Rogers' Stores, in Atlanta and surrounding territory. Beginning Jan. 1 it has been giving an Atlanta street car ticket for two returned bread wrappers and five cents, or two car tickets for four bread wrappers and 10 cents, etc. As the car ticket sells for $7\frac{1}{2}$ cents (or two for 15 cents), this means a reduction of one-third on all tickets or else $1\frac{1}{4}$ cents for each bread wrapper returned, whichever way the transaction is figured.

**STREET CAR
TICKETS
ON SALE AT ALL
ROGERS
STORES**

Dash sign carried on Atlanta cars to advertise sale of tickets at chain grocery stores

the grocery store \$1,500 worth of tickets. This number the stores replenish daily for cash. At the end of the campaign the stores will naturally account to the railway company for the \$1,500 worth of tickets advanced at the beginning of the sale. In addition, the company carried a dash sign for a few days reading "Street car tickets on sale at all Rogers stores." A reproduction of this sign accompanies this article.

On its part, the stores, beside the special offer mentioned, have agreed to sell tickets to anyone at the rate of four for 30 cents or in multiples thereof, to carry in their store windows a card reading "Street car tickets for sale here" and to advertise in the daily papers their plan of exchanging bread wrappers for car tickets.

Car tickets are also on sale at the company's office, the starter's office, company stores, a chain of private drugstores and at another large store. They are also sold by conductors and one-man car operators.

On Jan. 30 the store proprietors reported that during the month their sales of bread had increased 400 per cent since the campaign was started and that they considered the plan highly successful.

Up to this time the principal outlet for tickets outside of the cars and the company's office was through a chain of fifteen drugstores in Atlanta, known as the Jacobs' stores. The only expense to which the railway company is put in connection with the sale of these tickets is to carry a dash sign occasionally on its cars, similar to that illustrated but reading "Use car tickets. On sale at Jacobs' stores."

On its part the drug company in its principal downtown store, which is at a busy intersection, has posted in a conspicuous place an illuminated car destination sign to indicate the route of approaching cars. It is operated by a colored porter in front of the store who



A popular drug store in Atlanta operates a car route sign for the benefit of its patrons

pushes the appropriate button when any car comes in sight, thus apprising the store patrons of the fact. The accompanying view shows the position of this sign and how the arrivals are indicated. The cost of the sign and its running expenses are defrayed by the drug company.

In a recent interview with a representative of the ELECTRIC RAILWAY JOURNAL, the manager of the drug company said that the illuminated sign and dash car card on the railway company's cars were considered excellent advertisements. The effect of the sign was to induce street car patrons to utilize the store as a sort of waiting room, especially on rainy or sultry days. This is considered an advantage because in looking around the store they undoubtedly saw and bought articles that they would not have come in to purchase. While unable to estimate the extent to which the plan had increased the business the management stated that no doubt the additional amount so obtained more than repaid the investment and maintenance cost of the sign.

These two outlets for tickets are considered advantageous by the company because they relieve the conductors and one-man car operators from selling tickets.

New Carhouse and Housing Plans in Turin, Italy

CONSTRUCTION of a new carhouse to accommodate about 300 cars has just been finished by the municipal electric railway at Turin, Italy. Adjoining the carhouse is a track yard which will be served by a bridge traveling-crane with a span of about 48 ft. Adjoining the track yard, in turn, is an apartment building, being erected to house the employees operating from this depot. This housing undertaking has 430 rooms, divided into apartments of different sizes.

The Turin electric railway system has grown rapidly during the past twenty years and in 1927 had a total of 555 cars. The passengers carried in 1927 were 203,322,000.



Training school of the New Orleans Public Service, Inc., showing the school car, the controller platform and the electric circuit board

Well-Trained Motormen Create Good Will

Co-operation between the instruction department and the rolling stock and shops department of the New Orleans Public Service aids in training motormen

By E. J. Murphy

Superintendent of Instruction and Employment
New Orleans Public Service, Inc., New Orleans, La.

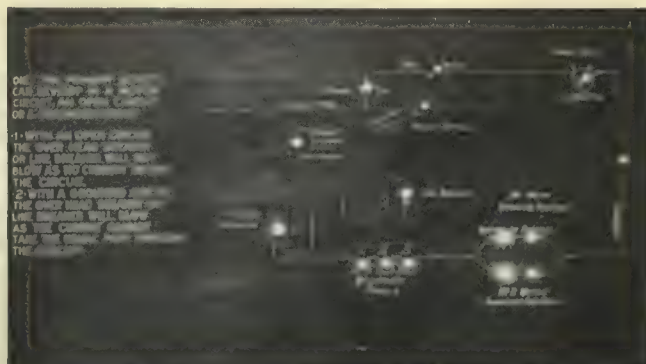
This article gives details of the instruction methods of this company, which has made a remarkable record of freedom from failures. It is based on a paper presented by the author at the meeting of the Electric Railway Association of Equipment Men, Southern Properties, held at New Orleans on Jan. 25-27, and supplements information published in this paper for Aug. 2, 1924.—EDITOR.

GOOD equipment and well-trained operators mean good service to the public, as well as increased earning power for the company. As practical electric traction men, we understand in a general way what a pull-in of a defective car means, particularly during the peak; the havoc it creates in headway, causing patrons to wait an unnecessary length of time to board a car, and also the disarranging of schedules. This kind of service does not help build a good public relationship, which today is a matter of vital importance.

Frequently after an investigation of a defective car pull-in, causing a long delay, some trivial defect was found the cause of all the trouble and very easily could have been eliminated had the motormen been trained properly. In 1921, with this problem still unsolved, we decided to make every reasonable effort in New Orleans

to decrease our defective car pull-ins, and with this object in view our motormen were checked in the operation of their cars.

The training school was established and all new men entering the service were instructed thoroughly in locating and eliminating nominal defects, and shown the path of the current through the electrical apparatus of the car



An electric board is used in explaining the electrical circuit and defects which develop in the circuit. The motors can be shown either in series or in parallel



The school car, fully equipped for operation, is mounted on a stationary platform. Note how all equipment is exposed

by competent instructors. The improvement noticed in the handling of the electrical equipment by new operators became so noticeable that we decided to bring in all our regular motormen on the company's time to train them the same as new men. The response to this request was remarkable. Many of our old motormen willingly grasped the opportunity to learn more of the equipment they were handling. During this period we found 75 per cent of the old men in need of such instruction. The result has been a source of satisfaction. The initial cost has been amply repaid to the treasury in competent operators and first-class equipment.

CO-OPERATION OF DEPARTMENTS A HELPFUL FACTOR

Our superintendent of rolling stock and shops and his men have co-operated to the fullest extent in our efforts to improve our operators. At various times he has made new installations in the training school. Whenever a new device is installed in the electrical equipment of the cars in service a similar device is installed immediately at the training school. A great deal of our success in training men can be attributed to the good feeling existing between the two departments.

A definite course of instruction is followed in training the motormen. New employees enter the training school the morning after being accepted by our medical examiner for employment. The students are then taken in hand by one of the instructors at the training school and told the company's policy to the public and to the employees. Particular stress is laid on courtesy, cleanliness, loyalty and honesty. The talk is supplemented by reading copies furnished by the superintendent of transportation of a number of commendatory letters from patrons received by trainmen already in our service. Although this instruction requires but one-half hour, the students acquire a good idea of the policy of the company concerning their duties as motormen, a very important part of which is to make every passenger satisfied.

After this instruction, the students are assigned to a stationary platform equipped with one type K-36-J and two type K-11 car controllers. Here they are trained to handle the controllers. Four rows of five lamps each

are connected to one of the K-11 controllers to illustrate the functioning of the resistance. On the first point, the entire cluster of lamps is illuminated, indicating that all the resistance is in the circuit. The lamps are extinguished by rows until in the running position, the lamps are all extinguished, showing the starting resistance is no longer in the circuit.

ELECTRIC BOARD SHOWS COMPLETE TROLLEY CIRCUIT

The course of the electric current from the power house through a car and return is explained next to the class. For this purpose an electric board shows by lamps and heavy white lines the several parts of the circuit. The board measures 3x7 ft. and is mounted on the wall in plain view. The flow of the current is traced from the generator at the power plant through the main feeder, feeder taps, trolley wire, trolley wheel, trolley pole, trolley base, trolley lead, automatic line breaker, overhead circuit breaker, controller, resistance, motors in series or in parallel, motor ground leads and the rails back to the power house. Each unit of the electric apparatus is illuminated by small lamps controlled by switches handled by the instructor.

Following the electric board instruction the students are assigned to the school car, an old stationary car, fully equipped. The car has a K-68-A controller on one end and a K-35-JJ on the other. The resistance is an ordinary grid resistance and is supported on a stand on the floor, with all wiring in plain view. The resistance can be grounded or open-circuited by the instructor at will. The air equipment is mounted upon the floor of the car where its operation can be explained and observed more easily. A d.c. voltmeter on the side of the car is used in the discussion of line voltage. An ammeter is used also to show the difference in the current required with proper and improper handling of the controller.

All parts of air-brake equipment are explained fully while the car is in motion.

Each student is stationed on the platform of the car and given further instructions in handling the controllers and the air valves. This trial operation takes place with the car entirely clear of defects. The instructor then opens or grounds a part of the circuit and requests the student to repeat his former operation. The car is equipped with levers, with which any of several defects can be placed in the circuit. Instruction is given in the



The air-brake equipment is mounted upon the floor of the car and can be inspected easily

method of locating the trouble and making the necessary repairs. As many as three or four defects are thrown in the circuit at one time and the student is expected to discover them.

After the preliminary instruction each student is assigned to a platform instructor and is expected to operate cars on various lines. During the entire period, usually fourteen to eighteen days, he is followed up by a representative of the instruction department.

The student is expected also to return each day to the instruction department for further study in preparation for the final examination, which is conducted by the superintendent of instruction. It includes the locating and repairing of all defects. If the student passes, he is assigned to the station and his name placed on the extra board. Thirty days later he is sent back to the training school by the station master to take a written examination of 81 questions pertaining to his work. He then is followed up constantly for 60 days by three road inspectors or follow-up men, who make reports on his progress in the handling of cars.

Steel Bridge Replaces One of Concrete

REPLACEMENT of a concrete arch bridge with a 114-ft. steel bridge weighing 100 tons was the difficult and unusual task just finished by the Portland-Lewiston interurban division of the Central Maine Power Company. The new bridge was placed in position during the interval between the time the last car went over the old bridge at midnight Wednesday night, Dec. 14, and daylight the next morning. Work of lowering the heavy structure into place continued through the day and the first car passed over the steel at 2:20 in the afternoon.

The only semblance of inconvenience to passengers was for a few hours during the morning when they were transferred from the cars around by bus. By noon-time approaches to the bridge had been built on an incline to serve as a temporary track while the old concrete bridge below was being blasted out and the new steel dropped finally into its permanent resting place.

Although concrete is ordinarily replacing steel in modern bridge work, the reversal of that custom in this instance is due partly to extraordinary conditions which resulted in the acid-bearing waters of the Presumpscot River causing unusual decomposition of the concrete during the seventeen years of its existence.

A feature of the engineering work was the moving of the steel bridge, mounted on two standard gage railroad car trucks, from the siding about 2 miles away, where it was completely assembled, to the river site. It was necessary to proceed slowly because clearance of the telegraph poles on the side of the roadbed was scarcely enough to allow the huge "car" to pass. The trip took one hour and ten minutes.

No difficulty was encountered in setting the new bridge into place. The trucks were run across the old concrete bridge and after the ends had been jacked up and the trucks removed the span was dropped down on the temporary abutments which had been prepared for it. A temporary supporting arch had been placed under the bridge to guard against possible accident until the new span could be set up. Preparations for replacing the bridge had been made for three weeks. The work was done under the direction of the Sanders Engineering Company and Webster & Libby, consulting engineers.

Effect of Unsprung Car Weight on Track Wear

Berlin Surface Lines measures vibrations produced at rail joints and crossings by cars with motors having different kinds of mountings

EFFECTS of reduction of unsprung weight on rail wear, particularly at joints and in special work, in connection with electric cars equipped with bevel gear drive, have been studied by the Berlin, Germany, Surface Lines, which operates a number of such cars. Measurements were made with a vibration meter to determine the extent of the blows delivered by the wheels of cars of about the same total weight but with different

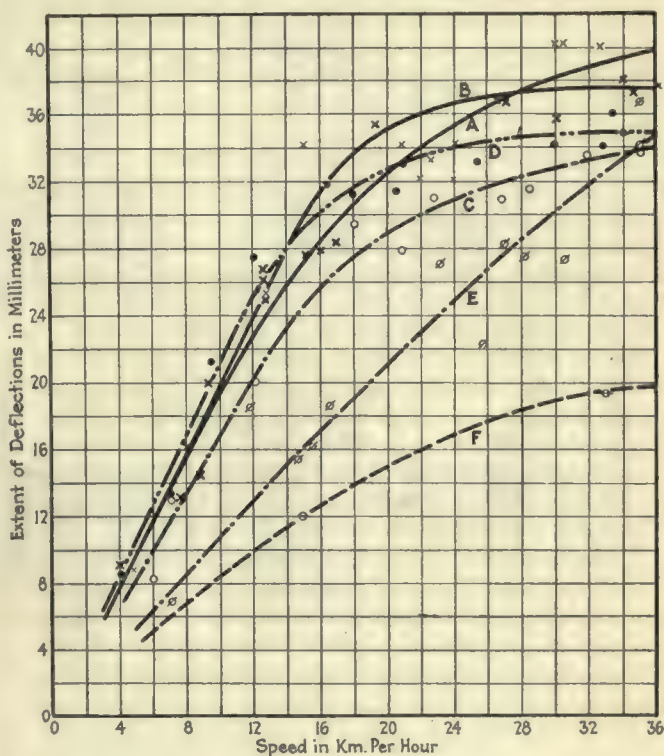


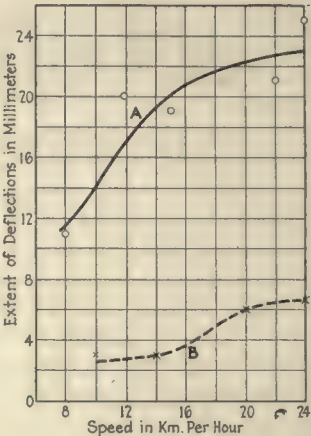
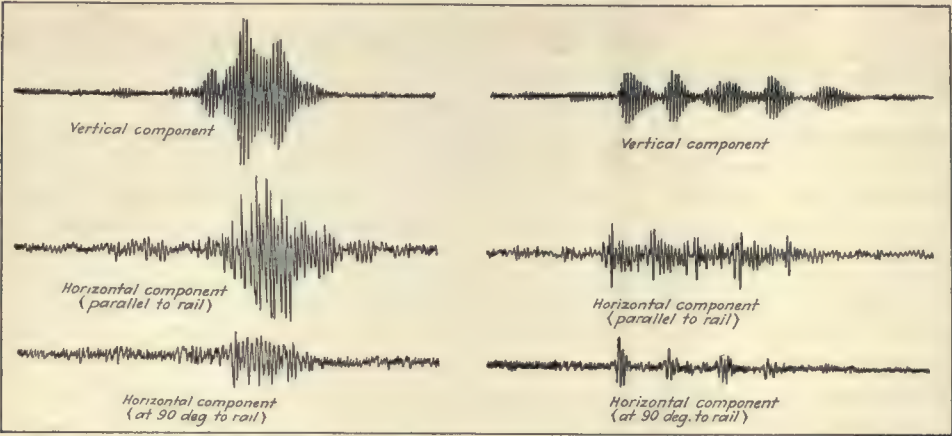
Chart showing the geometrically added deflections in the direction of the three components (vertical and two horizontal) for various cars at various speeds, viz.: A, axle-suspended motor car, empty; B, same with 500 kg. extra unsprung weight; C, beveled-gear motor car, empty; D, same with 3,000 kg. regular load; E, maximum-traction truck car; F, four-wheel trail car

proportions of unsprung weight. The results are given in an article by Ph. Kramer, one of the engineers of the Berlin Surface Lines, and published in the issue of Jan. 28, 1928, of the *Zeitschrift des V.d.I.*

The tests were made by operating cars of different types across an electric railway over steam railroad crossing. The electric railway rails at this point are flange-bearing, so the electric car wheels run on their flanges up to the point where the groove in the steam railroad rail occurs. Here the electric railway wheels, which were of 28.4 in. diameter, in passing over the steam railroad groove with a width of 1.57 in., were able theoretically to drop a maximum of 0.006 in.

The cars tested were of the following types:

1. A single-truck car with motors suspended in the usual way from the axles. The weight of the car empty



At the left are reproductions of typical records obtained with the vibration meter when a car passed over the crossing. The three at the extreme left were made with the car traveling at 27 km. (17 miles) an hour and the second group with the car traveling at 8.8 km. (5½ miles) an hour. The chart at the extreme right gives a comparison of the blows on the motor when (A) it is supported on the axle and (B) when it is fully spring supported and equipped with bevel gear.

was 24,640 lb.; the gear ratio was 1:5.92; unsprung weight per axle, 2,486 lb.; wheel diameter, 28.4 in.; wheelbase, 9 ft. 2 in.

2. A car similar in type, spring support, etc., to the one just mentioned, but with spring-supported motor and bevel gear with double reduction. The gear ratio was 1:6.03 and the total weight was 26,114 lb., of which the unsprung weight, including gear cases and axle journals, was 2,182 lb. per axle. The wheel diameters and wheelbase were the same as in the first car.

3. A car mounted on two maximum traction trucks drawing an empty four-wheel trailer. The data of the maximum traction truck car were: wheelbase, 51 in.; truck base, 18 ft.; wheel diameters, 31½ in. and 22 in.; total weight 33,880 lb. The trailer data were: total weight, 15,400 lb.; wheel diameter, 28.4 in.; wheelbase, 9 ft. 2 in.; unsprung weight, 1,320 lb. per axle.

The vibration meter, which was somewhat similar in design to a seismograph, registered the vibrations in a vertical and in two horizontal directions. The diagram on page 403 shows the result of a number of readings in which the ordinates are the geometrical sum of

One great merit claimed for the spring support of the motors is that it reduces the shock to the motors themselves, as compared with the method of supporting one end of the motors on the axles. Tests to determine the extent of these blows were also made in conjunction with the State Railway Department, with a somewhat different type of machine. The cars were the same two four-wheel cars used in the other tests and were operated over the same crossing. The curves reproduced show greatly reduced shocks on the car with spring supported motors, as compared with a car in which the motors were sleeved on the axles.

\$1,956,600 Stock Sold by Virginia Company in One Day

OFFERING for sale nearly \$2,000,000 of its 6 per cent cumulative preferred stock on one day last September and selling entirely by the close of business the same day was the unique experience of the Virginia Electric & Power Company, Richmond, Va. "A week before," writes A. H. Herrmann, director of public relations, "we had offered our employees the opportunity to take as much of the issue as they wanted and, based upon past campaigns in which they had subscribed to about 1,700 shares, we fixed the quota this year at 2,000. Their actual subscription totals 2,127 shares."

As remarkable as was the success of this sale, it was not achieved without some lively work on the part of officials in the matter of extensive publicity, both through the mails and through newspaper, car and bus advertising mediums. Under date of Sept. 17, President W. E. Wood, in one of his regular letters, offered stockholders the opportunity to absorb some of the new issue, prefacing the offer with the following statements:

We have now completed the high-power transmission line extension from Suffolk into Elizabeth City, Hertford and Edenton, N. C. We have also completed other extensions into north-eastern North Carolina, whereby we have added to our service a number of additional towns and, incidentally, many new customers. The latest towns to be added include Rich Square, Ahoskie, Winton, Aulander, Severn, Milwaukee and a number of others. At this writing we are nearing completion of the extensive addition made to our Reeves Avenue steam power station in Norfolk, at a cost of about \$5,000,000.

The co-ordination of our street railway and motor bus transportation in the several cities served is working out most satis-

DATA OF CARS TESTED

Type of Car	Total Weight—		Unsprung Weight	
	Metric Tons	Pounds	Per Axle Kilograms	Pounds
Car with axle suspended motors.....	11.2	24,640	1,380	2,486
Car with axle suspended motors and 500 kg. extra unsprung weight.....	11.7	25,740	1,380	3,036
Car with beveled gear motors.....	11.87	26,114	992	2,182
Car with beveled gear motors with 3 tons load.....	14.87	32,714	992	2,182
Maximum traction car.....	15.4	33,880	.....	.....
Trail car with four wheels.....	7	15,400	600	1,320

the vibrations in the three different directions (vertical and two horizontal), measured in millimeters, and the abscissas are the speeds in kilometers per hour. Tests were made with both loaded and empty cars, as shown in the table. It will be seen from the tests with empty cars that the car with bevel drive caused less vibration than the one with axle suspended motors, and with loaded cars this was the case for speeds of more than 7½ miles (12½ km.) per hour.

Up to speeds of 21½ miles (34 km.) per hour, the double-truck car caused considerably less vibration than either of the others, though the number of blows was, of course, twice that of the four-wheel cars. The trailer naturally gave the most favorable results. The data of the cars tested are presented in the accompanying table.

We Treasure Your Confidence

Two years have now passed since Stone & Webster, Inc., assumed the management of the Virginia Electric and Power Company.

During this time there has been accomplished a wonderful improvement in the service rendered by the Company and an enormous expansion of facilities making our electric service available to practically all the cities and towns throughout the territory served by us in Virginia and Northeastern North Carolina.

These accomplishments include the expansion of our territory by the acquisition of other properties, the construction of high-power transmission lines linking up our large steam power stations and our various water-power developments, the construction of new power station units; the co-ordination of our transportation service into unified systems by the acquisition of motor bus lines and the extension and re-routing of both motorbus and street railway lines; the lowering of gas and electric rates and the adjustment of transportation fares; increasing the wages of trainmen and reorganizing the Employees' Benefit Association under which benefits in times of need are practically doubled.

THROUGH THESE ACCOMPLISHMENTS THE COMPANY IS NOW IN A POSITION TO FURNISH ABUNDANT POWER AND TRANSPORTATION FOR ANY POSSIBLE FUTURE GROWTH AND IS PROVIDING THE ENTIRE TERRITORY WITH A PUBLIC SERVICE OF WORTH AS IT MAY BE THOUGHT.

Practically \$20,000,000 has been expended by the Company during this period for improvement and expansion. However, it would not have been possible to accomplish this had not the citizens of this section received the new management in such a fair-minded and cordial manner.

From the start those whom we are privileged to serve showed their confidence in our organization and inspired in every officer

and employee of the Company a desire to live these expressions of good-will. There can be no doubt that this mutually beneficial good-will is THE MOST TREASURED ASSET OF OUR COMPANY.

In the many meetings with civic clubs and other groups of citizens to which we have been invited, we have been able to work out with them a satisfactory solution of any problem or complaint which they have had in mind. These meetings have enabled us to study our patrons' problems and at the same time set forth our ideas and ambitions for rendering them the best in public service.

We have always felt that there is no surer way of maintaining this public confidence than by inviting those whom we serve to BECOME PARTNERS WITH US. We, accordingly, made two offerings of Preferred Stock—one in November, 1925, and a second in December, 1926, which resulted in large over-subscriptions to both issues, and we are very pleased that the results have proven most beneficial to the Company, the public and our new partners alike.

We are now pleased to announce that we are again able to invite you to participate with us in an additional issue of approximately \$1,965,000 of 6 per cent Cumulative Preferred Stock which we are placing on sale on Monday morning, September 19. The price, terms and conditions of this sale will appear in the newspapers in our territory on the morning of the 19th. Orders may be placed at any of the Company's offices, through Company employees or any banker or broker.

Because of the popularity and success of our stock sales last year and the new edition of this entire list of our employees' Tidewater Virginia.

Virginia Electric and Power
Richmond Norfolk Portsmouth Petersburg
Hopewell Fredericksburg Williamsburg R

BECOME PARTNERS WITH US BUY ELECTRIC PREFERRED STOCK

Newspaper "ammunition" used by Virginia Electric & Power Company in stock-selling campaign

factorily and the new buses and street cars purchased have added greatly to improving and popularizing our service. You will also be interested to know that we have just formed a new Benefit Association for our employees. This in place of the former Relief Association. The new association is larger in scope than the old one in that it also includes all employee welfare activities, whereas the former association was confined to the payment of sick and death benefits. These benefits under the new plan are just about doubled. The new association will be of great service to our employees and will be the means of promoting still further the already very excellent *esprit de corps* in our company.

Through the confidence and co-operation of those whom we serve the Virginia Electric & Power Company during the two years under Stone & Webster management has spent approximately \$20,000,000 in providing, improving and expanding its facilities in Virginia and northeastern North Carolina. Thus, we are continuously making additional expenditures for further improvements and expansion.

Being a stockholder in our company, you will be interested in the additional issue of \$1,965,000 of 6 per cent cumulative preferred stock which our company is now offering to its employees, its customers and the citizens of tidewater Virginia and northeastern North Carolina, and this letter is sent you inviting your participation with us in our plans for further expansion to meet the greater demand for our service in this growing territory.

In the newspaper advertising, of which there are reproductions on this page, purchasers, both employee and otherwise, were given the privilege of buying the stock on the installment plan at \$7.50 as the initial payment and \$10 per month installments. With a par value of \$100, those buying the stock outright and making pay-

ment as of Sept. 20 acquired the shares at \$97.50. The proceeds from the stock sale are to be used in increased service throughout the company's territory and for additions and betterments.

Safety Practice Shows Results in St. Louis

STREET cars in St. Louis, Mo., were involved in 1,675 fewer accidents in 1927 than in the previous year, according to a report made to the St. Louis Safety Council by the St. Louis Public Service Company. Accidents in 1927 totaled 17,097, the lowest for any one year since 1920. In 1920 there were only 61,782 motor vehicles in St. Louis compared with about three times that total now.

The average number of car-miles per accident was 2,450 in St. Louis compared with 2,380 for 57 street railway lines reporting to the American Electric Railway Association.

Collisions between street cars totaled 229 in 1927 and 312 in 1926, and collisions with motor vehicles 9,606 against 10,526 in the previous year. Collisions between street cars and pedestrians number 368 compared with 485 in 1926.

CONFIDENCE That We Appreciate

The immediate oversubscription to our additional issue of \$1,965,000 of 6% Cumulative Preferred Stock demonstrates a confidence on the part of our customers that we appreciate and will earnestly endeavor to merit.

We are happy to add many new partners to our enterprise, and we sincerely regret that owing to the limited size of this issue there is insufficient stock to permit us to accept as partners all those who indicated their desire to share in our business.

Virginia Electric and Power Company
J. FRANK MCCABRELL, Vice-President
W. R. WOOD, President
TOM F. WALKER, Vice-President

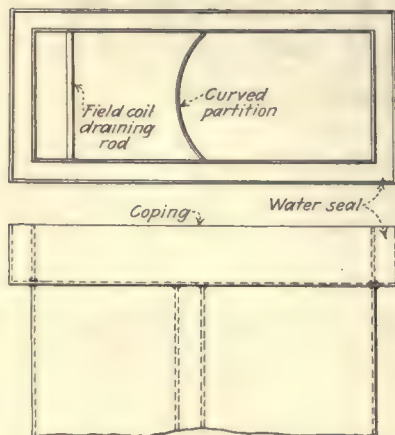
Maintenance Methods *and* Devices

Two-Compartment Portable Dipping Tank

WHERE lifting facilities are limited it is advantageous to have a portable dipping tank which can be transported to the chain hoist to deposit or remove an armature and then be returned to its place of storage. It was found necessary to



Two-compartment dipping tank in shop of the Binghamton Railway



Construction details of tank

construct such a tank in the shop of the Binghamton Railway, Binghamton, N. Y. This tank is made of $\frac{1}{8}$ -in. sheet iron which is welded to 1-in. angles. It is 36 in. long, 23 in. wide and 42 in. high. It is mounted on two $\frac{3}{8}$ -in. x $3\frac{1}{2}$ -in. flat bars, each end of which is fitted with a swivel wheel 3 in. diameter and 1 in. face.

The tank is constructed with a No. 16 galvanized iron coping $3\frac{1}{4}$ in. high, which projects $1\frac{1}{4}$ in. on all sides. This coping is made with a

double wall and the space is filled with water. The edges of the cover drop into the space, which acts as a heat seal for the cover. The tank is divided into two parts by a curved iron sheet. The portion of the tank on the concave side of the partition is used for the dipping of armatures whereas the other section is used for the dipping of fields. This permits the use of one grade of varnish for the fields and another grade for the armatures at the same time.

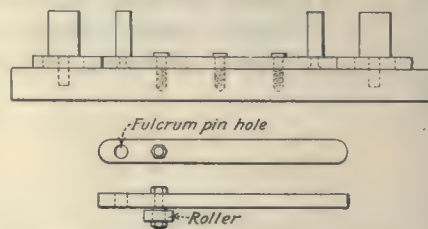
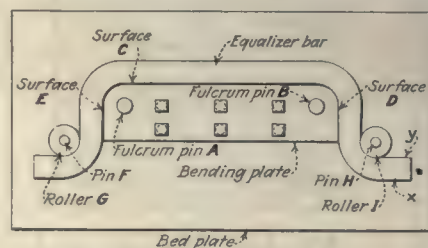
The field coils are drained by suspending from a $\frac{3}{4}$ -in. round rod fastened across the top of the field compartment. The armature is drained by suspending on a chain hoist over the armature compartment.

Equalizer Bar Bending Form

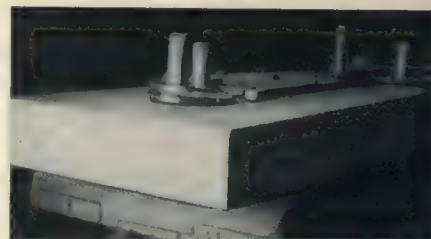
BENDING of equalizing bars so that all surfaces are parallel is done in a bending form designed and constructed in the Woodside shop of the New York & Queens County Railway, Long Island City, New York. This was designed by Thomas V. Campbell, superintendent of maintenance for Fisk & Roberts, managers of the property. The radii are identical and the distances between the curve centers are the same on all bars. Considerable trouble was experienced in making the bars symmetrically before this form was put in service. The form consists of a bed plate, form plate, radius rollers, and fulcrum pins. The cast-iron bed plate is 2 ft. wide, 6 ft. long and 6 in. thick. A $\frac{7}{8}$ -in. plate, 10 in. wide and of the correct length is bolted to the center of the bed plate, and the upper corners are rounded for the desired radius. Two 2-in. x $4\frac{3}{8}$ -in. steel pins are riveted on either end of the plate, and are used as fulcrum centers for the shaping bar shown in the sketch. A movable 2-in. x 4-in. pin installed at a predetermined distance from either end of the form plate, and designed with a $3\frac{1}{4}$ -in. roller, obtains a proper radius on the short end of the bar.

The hot bar is clamped to the bed plate in close contact with surface C of the form plate while the radius pins F and H are removed. The bar is then sledged toward both ends of the form plate. The shaping bar is

then slipped on the fulcrum pins A and B alternately and is given a rotary motion to permit the rollers to give the outer surface the correct radius. Pins F and H are then reinstalled, and the ends of the bar are sledged upward against the rollers. Another shaping bar of a slightly different radius than the one used on pins A and B is used on pins F and H alternately to obtain the proper radius of the lower corners. The bar is then



Equalizer bar bending form

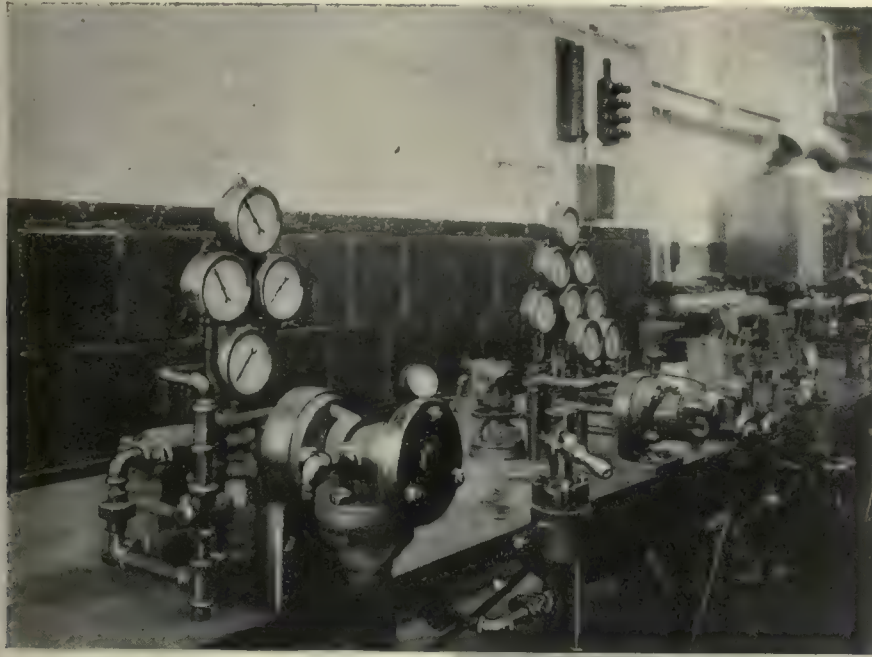


Details of bending form

sledged downward on the bed plate to make the surfaces parallel. It is then removed from the form and the short end surfaces, X and Y, are paralleled on the bed plate surface.

One Man, Not Two

IN THE description of an oil heater for thawing frozen switches as used by the Toronto Transportation Commission and published in the Maintenance Data Sheet section of the JOURNAL for Feb. 18, the last sentence read "Only two men are required for operation." A feature of this device is that but one man is needed for successful working.



Careful Tests of Air Brake Equipment Insure Correct Operation

PROVISION for testing all the types of air brake equipment used on its cars is made by the Brooklyn-Manhattan Transit Corporation in its DeKalb Ave. surface repair shop. Cars coming into the shop for over-



Old Buses Utilized as Work Cars

PURSUING a policy of putting its older buses, which have been withdrawn from passenger service, to some practical purpose, the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has rebuilt in its own car shops a number of such vehicles as work trucks. The illustration shown below indicates what has been done in revamping one of these older buses for use as a wrecking car.

The rebuilt bus is equipped with a Manley crane installed on a sliding framework which permits its extension several feet out from the rear of the body. As shown, the crane can be pushed into the car where it is completely out of the way when not being used. Included in the mechanical equipment of the wrecker is a hand-operated winch. A number of compartments are built into the

framework of the truck at accessible points. This permits carrying a fairly comprehensive set of tools and supplies with which to facilitate the work to which the truck may be put in an emergency.

Systematic repairs — increase fares.

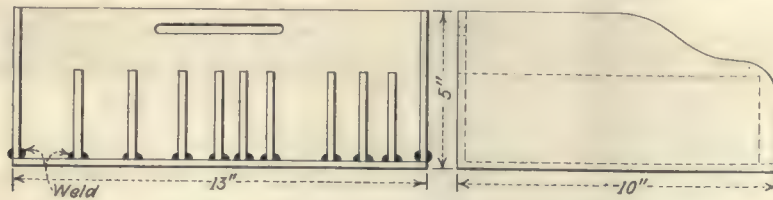


Milwaukee rebuilds buses such as this for use as service trucks

hauling are stripped of all air brake equipment which is then sent to the air brake room for overhauling and testing. The first step for the air brake repairman is to take the equipment apart, wash it with kerosene and then blow it off with compressed air so that all ports and parts are cleaned thoroughly. The parts are then overhauled, after which all valves are put on the test bench and tested for leaks and to see that they operate properly. When found O. K., the valve is taken from the test bench and is ready to be put back on the car again.

Governors are cleaned, overhauled, tested for leaks and also readjusted. Compressors are cleaned and dismantled by the air brake repairman's helper and are then sent to the repairman, who overhauls them, after which they are given a good test before leaving the air brake room.

The test bench in the air brake room of the DeKalb Ave. surface repair shop is made for the following tests: motorman's operating valves, triple valves and emergency valves, foot valves, pilot valves, shut-off valves, double-check valves, air



Rack for holding miscellaneous armature winding material

gages, governors, slack adjusters, door engines, all kinds of cocks, safety valves, conductor emergency valves, circuit-breaker cylinders and door engine magnet valves.

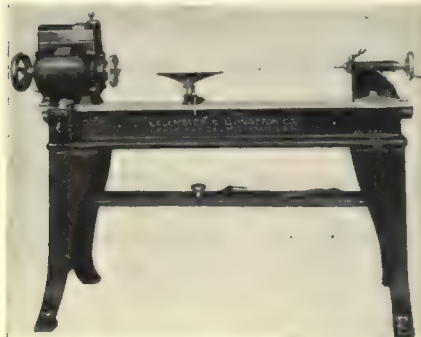
Armature Material Rack

MANY small pieces of fiber, mica, and similar materials are constantly required during the winding of an armature. Where this material is not at hand there is a loss of time and the cost of production is increased. This is not all. Where

provisions are not made for the proper care of this material much of it finds its way to the floor and is swept out. This has been overcome in the armature room of the Binghamton Railway, Binghamton, N. Y., where a rack constructed for such material is placed within easy reach of the worker. This receptacle is an open-partitioned box, made of No. 16 gage galvanized iron. It is 13 in. long, 5 in. high and 10 in. wide. All of the parts are acetylene welded. A hole in the back sheet provides a convenient means for carrying.

New Equipment Available

Lathe Equipped with Multiple Speed Motor



Speed lathe with direct-connected motor

MULTIPLE speed control with a Union motor built in the head of a speed lathe is announced by Gallmeyer and Livingston, Grand Rapids, Mich. The multi-speed ball bearing motor of $\frac{1}{2}$ -hp. capacity provides for spindle speeds of from 570 to 3,450 r.p.m. The machine handles work up to 12 in. diameter over the bed and up to $9\frac{1}{2}$ in. over the tool rest. Heavy cast legs provide a rigid support to the bed, eliminating vibration. A shelf is located below the bed in a convenient position.

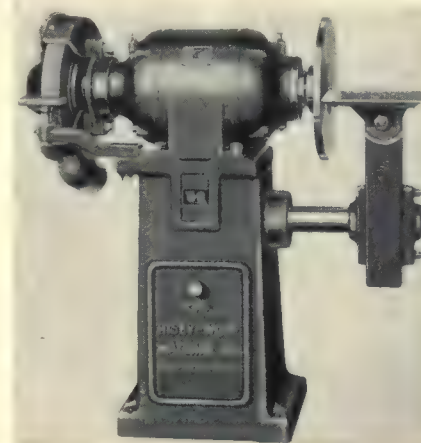
These speed lathes are equipped with a rigid tailstock which may be located in position or released by a half turn of a special wrench furnished with the machine. The $1\frac{5}{8}$ -in. tailstock spindle is bored to a No. 2

Morse taper. Adjustments are made by means of a hand wheel conveniently located, and the spindle is held rigidly in place by a quarter turn of a lever.

The tool rest is adjustable vertically and swings at any desired angle. The rest may be moved to any point on the bed and locked in the desired setting.

Combination Disk and Floor-Stand Grinder

FLOOR-STAND grinders arranged with a combination disk are announced by the Hisey-Wolf Machine Company, Cincinnati, Ohio. The spindle is mounted on two ball

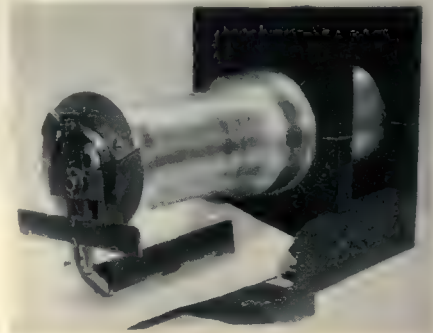


New combination grinder

bearings which take radial load only. A double-acting, self-aligning thrust bearing is provided to take all end thrust. The spindle, made of special tough steel, is of extra heavy construction, and a work table $8\frac{1}{4}$ in. x $9\frac{1}{2}$ in. is standard equipment.

Splash Lubrication for Car Journals

SPLASH lubrication of car journals is the purpose of a device announced by the Hinge Car-Axle Oiler, Toledo, Ohio. It is intended

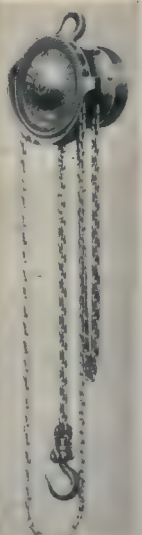


Splash oiling device attached to end of car journal

to take the place of the waste and oil arrangement of present journal boxes. The splash oiling arrangement attaches to the end of the car axle and dips into the oil placed in the ordinary type journal box. An arm raises the oil and spreads it on the axle as it rotates, thus keeping the bearing supplied with lubricant.

Chain for Lifting Heavy Loads

ELECTRICALLY welded chain of high carbon content is announced by the Ford Chain Block Company for its Triploc hoist. Each link is proof tested with special instruments. When the chain is assembled, it is tested again to make certain that it has strength of more than 50 per cent above its rated capacity. Hoists are built in capacities from $\frac{1}{4}$ to 20 tons. The chain must have great strength and ability to withstand wear, and must not stretch to any extent under heavy load.



High-carbon electrically welded chain fitted to Ford Triploc hoist

Association Activities

Uniform Vehicle Code Urged

DISTRIBUTION has just been made of the address on the uniform vehicle code made by A. B. Barber, manager transportation and communication department, Chamber of Commerce of the United States, before the Illuminating Engineering Society on Jan. 11. Colonel Barber points out the extent to which the automobile with defective brakes, lights or other essential equipment is not disclosed by any available statistics. He is of the opinion that many accidents charged to recklessness or inattentive driving really are due to faulty maintenance. As an indication of this he points to the large number of vehicles that may be observed with defective head lighting equipment observable anywhere on any night.

In order to reduce the accident toll and to bring about betterment of traffic conditions there are three lines of approach: (1) provision and maintenance of adequate facilities, which embraces the highway and the vehicle; (2) education in the safe and proper use of the facilities, and (3) exercise of public authority in the administration and enforcement of laws and regulations governing such use.

The third of these means of traffic improvement, Colonel Barber points out, is being furthered in preparation of the uniform vehicle code. This is one of the principal results of the 2½ years of work of the National Conference on Street and Highway Safety. The code as finally completed has been endorsed by the American Bar Association. The code is having rapid acceptance, considering that it was only completed in August, 1926. Outside of the North Atlantic region, which already had systems of automobile administration substantially as provided for in the code, some ten states took favorable action in 1927. Three other states adopted modifications.

A point of special importance is that of clearance lamps on trucks, buses and trailers having a width in excess of 80 in. The code requires one such lamp with a white light located at the front and another with a yellow or red light located at the rear, both on the left side of the vehicle. Serious accidents have occurred due to failure to maintain such lights, and similar accidents have resulted from absence of tail lights on smaller vehicles.

Beside the uniform code work on a model municipal traffic ordinance is in progress. Secretary Hoover last summer appointed a committee, of which William E. Metzger of Detroit is chairman, to study and report on this question. The work has been divided into six subjects, as follows: (1) Vehicle movement and registration; (2) pedestrian facilities and regulation; (3) traffic signs, signals and markings; (4)

parking, garages, terminals, loading facilities and street obstructions; (5) public motor vehicles, railroads, street cars and emergency vehicles; (6) traffic organization and enforcement. Each of these subjects was assigned to a sub-committee. As a result a tentative draft of a model ordinance has been drawn up and will shortly be given widespread distribution for public criticism and suggestion.

Central Master Mechanics to Meet in Erie

ERIE, PA., has been selected as the next meeting place by the Central Electric Railway Master Mechanics Association. The sessions will be held on May 9 and 10.

New England Club to Meet in Springfield March 22

SPRINGFIELD'S experimental car and the results developing from its actual use during a period of months in city service will be described by W. L. Harwood, engineer of power and equipment Springfield Street Railway and Worcester Consolidated Street Railway, at the March meeting of the New England Street Railway Club to be held in Hotel Kimball, Springfield, Mass., on March 22. Treadle door operation, particularly with respect to the Springfield and Worcester cars, will be the subject of a paper by J. H. Van der Veer, sales engineer of the National Pneumatic Company, New York. These papers will feature the afternoon session, to open at 3:30 o'clock. They will be illustrated with motion pictures and slides and will be followed by general discussion.

Howard F. Fritch, Massachusetts, vice-president of the club, will preside at the afternoon meeting and also at the dinner, which is set for 6:30.

E. G. Buckland, vice-president of the New York, New Haven & Hartford Railroad, will speak at the dinner. His subject will be "Co-ordination of Transportation in New England." Other speakers will be Capt. Ralph Earle, U. S. N., retired, president Worcester Polytechnic Institute, and Robert Burrell, Boston. The toastmaster will be Major Frederick J. Hillman, executive vice-president of the Springfield Chamber of Commerce.

During the dinner there will be an entertainment by the Fisk Time-to-Retire Boys and Orchestra in person, sent directly from New York.

The program for the meeting is arranged by the Springfield and Worcester companies under the supervision of Clark V. Wood, president of the companies.

Transportation will be provided by

COMING MEETINGS OF Electric Railway and Allied Associations

March 13-15—Oklahoma Utilities Association, annual convention, Tulsa, Okla.

March 14-15—Illinois Electric Railway Association, Springfield, Ill.

March 21-22—Central Electric Traffic Association, Seelbach Hotel, Louisville, Ky.

March 22—New England Street Railway Club, Springfield, Mass.

March 23—Maryland Utilities Association, annual meeting, Emerson Hotel, Baltimore, Md.

March 30—Executive Committee American Electric Railway Association, 292 Madison Avenue, New York, N. Y.

April 6—Metropolitan Section, A.E.R.A., 39 W. 39th Street, New York, N. Y.

April 26-28—Missouri Association of Public Utilities, Jefferson City, Mo.

May 2-5—Southwestern Public Service Association, Dallas, Texas.

May 6-12—Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome, Italy.

May 9-10—Central Electric Railway Master Mechanics' Association, Erie, Pa.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 20-27—American Railway Association, Div. 5—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association), annual convention and exhibit, Atlantic City, N. J.

June 21-22—American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

July 27-28—Central Electric Railway Accountants' Association, Detroit, Mich.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

Springfield Street Railway buses for club members arriving by the Boston & Albany and New York, New Haven & Hartford Railroads between 11:45 a.m. and 5:25 p.m., these buses operating between the Liberty Street side of the Union Station and Hotel Kimball.

News of the Industry

Lower Rates on Pacific Northwest Traction

Reduced rates between Seattle, Wash., and Vancouver, B. C., were put into effect on March 1, by the Pacific Northwest Traction Company and are good on either interurban coaches or buses. With the beginning of the new rates, the company will double its service between Seattle and Vancouver, making four return trips instead of two as at present. The new rate will be \$1.95 one way to Seattle, compared with \$3, the former rate; the return rate will be \$3.65 against the old rate of \$4.65; between Bellingham and Vancouver, the new rate is \$1.50 one way, against \$2.15, the old fare, and a round trip charge of \$2.25 compared with \$3.65 formerly charged. The fares provide first-class passenger observation coaches, with full baggage allowance, and a full 30-day limit. Proportionate reductions for towns en route are announced.

John Hickok, railway superintendent, states that a further attraction will be offered in the reduction of running time.

Columbus City Council Revives Rail-Light Franchise

The Columbus, Ohio, City Council voted unanimously on March 5 to reopen franchise negotiations with the Columbus Railway, Power & Light Company. Members of the Council went into the reasons for the resumption of the negotiations at this time. The 25-year franchise with the Columbus company expired in 1926. Negotiations were broken off a year and a half ago by the company when it refused to accept the draft of the revised ordinance after it had been approved by the Council. The company considered certain terms as proposed at that time not to be in line with the trend of similar grants made in recent years.

Patronage Increases in Rochester's Subway

An increase of 11 per cent in February over January in passenger traffic of Rochester's new \$12,000,000 subway in the bed of the abandoned Erie Canal is shown in the report made public by James F. Hamilton, president of the New York State Railways, which operates the line. The underground trains carried 106,730 passengers in February and 95,840 in the preceding month. Part of this gain is accounted for by the starting of service on the west side of the railroad and by the diversion of Rochester, Lockport & Buffalo inter-

urban cars into the subway during the month.

High speed schedules are not yet possible because of incomplete feeder installation and repairs to be made to the roadbed. By April 15, President Hamilton told the ELECTRIC RAILWAY JOURNAL representative, it is expected that the railways will be able to give the public of Rochester real high speed service over the 8 miles of subway railroad from the suburb of Brighton on the east to the western limits of the city and through the heart of the downtown section.

Under terms of a proposal submit-

ted March 5 to the Interstate Commerce Commission, the Buffalo, Rochester & Pittsburgh Railroad will extend service over the 9-mile line of the subway railroad located entirely in the city of Rochester. The subway is owned by the city.

The existing contract between the railroad and the city provides for the interchange of traffic and for payment by the railroad of costs of haulage over the subway lines. By the new arrangements, the Buffalo, Rochester & Pittsburgh will be enabled to deliver and receive shipments direct from important industrial establishments.

New York Company Firm

Interborough refuses to budge from its determination not to treat with Amalgamated. President Hedley in letter to Mayor indicates company's position

STATEMENT and counter-statement have followed fast from both sides in the case involving the issues between the Interborough Rapid Transit Company, New York, and the Amalgamated which early in the week threatened an immediate strike. The union's official explanation of its failure to call a strike on Tuesday night to protect men alleged to have been discharged on account of their Amalgamated affiliation was that it did not "intend to be made the tool of the Interborough management in a campaign for a 7-cent fare," and that the company was trying to compel the strike for the purposes of strategy.

On March 2 Mr. Mahon addressed a letter to the Mayor, which, except for its salutation, follows:

Some 21 men have been discharged for seemingly no other reason than having joined the Amalgamated Association. In addition to that the company is preparing to lock out all members of the association. This is evident from the fact that the company is equipping its shops with bedding, cooking utensils and other paraphernalia to take care of strike breakers and employing strike breakers. This, of course, is exciting the employees who are members of the Amalgamated Association.

I think you know that the Amalgamated Association is desirous of seeing this matter brought to a speedy and satisfactory settlement without any strike or disturbances, and on the part of the Amalgamated Association I am hereby making suggestions that, if carried out, will bring about a settlement without any disturbances or interruption of work.

You stated to us in the conference this morning that the company had claimed to you that the 21 men were dismissed not for joining the Amalgamated Association but because of other reasons. On the part of the Amalgamated Association we believe, and the 21 men were told, that they were discharged for no other reason than that they were members of the association.

I therefore suggest that the company agree to submit the question of the discharge of all these men to you, as the Mayor of the city of New York, or to the Transit Commission of the city of New York, and that all the facts in connection with their suspension or discharge be submitted to you or to the Transit Commission of the city of New York by representatives of both sides, and if the men have been discharged or suspended because of their membership in the Amalgamated Association that they be reinstated and paid for the time they have lost. That during the time these matters are being considered by you or the Transit Commission the company cease hiring strike breakers and remove the strike breakers from its properties.

I assure you the Amalgamated Association will abide by your decision or the decision of the Transit Commission on these matters. We expect the company should agree to this plan by Tuesday evening, March 6.

The position of the company in the matter is made plain in the letter of President Hedley of the Interborough to Mayor Walker dated March 6. It was in reply to Mr. Mahon's letter. Mr. Hedley said in part:

Our discussion was amicable and I think I am warranted in saying that your affability went a long way to inspire in everybody the desire to discover a reasonable basis for action which might avert a strike. A plan was devised for an examination by our law department into the facts upon which the Brotherhood had acted in expelling certain employees, thereby causing their suspension by the management pending an investigation to satisfy the company whether there was just cause for such expulsion. The Brotherhood members had assured you that the men had been expelled not only because they had become members of the Amalgamated Association contrary to their pledge to their Brotherhood and their agreement with the company, but because in addition they had been guilty of

stirring up strife through bad language and disorderly conduct towards their fellow employees. You were assured that if any injustice had been done it would be righted. You seemed to have confidence in the good intentions of everybody to that effect. Upon leaving your office steps were taken at once to carry out the program suggested.

However, it seems that the Amalgamated Association was not content to let the Mayor of the city proceed in his own way to avert a strike. That association insisted that it be made a party to the proceedings as a condition of withholding its threatened strike. That insistence entirely changes the situation. No suggestion that the Amalgamated should supervise the proceedings was made at our meeting with your Honor. But that is the demand of Mr. Mahon in addition to undertaking to dictate what this company must do about hiring new men.

Mr. Mahon's letter refers to a "dispute" between his association and this company. There is no such dispute.

This company does not recognize any right on the part of Mr. Mahon or of the Amalgamated Association to represent any employees of the company. Therefore, no attention will be paid to any of his suggestions about procedure. Nor will this company cease hiring new men (called strikebreakers by Mr. Mahon) or remove such newly hired men from its properties at the demand of Mr. Mahon or of his association.

On the contrary every effort will be made by us to maintain a reserve force of competent men to take the places of such employees as may be dismissed or are persuaded to strike, or "get beyond the control" of the Amalgamated leaders, or leave the service for any reason whatever. We intend to continue to take every precaution to see that the public suffers as little as possible from the efforts of the Amalgamated organization once more to disrupt our service.

For your information I desire to say that we have carefully looked into the cases of the men who were expelled. In each case there was evidence of misconduct of the character related to your Honor. I have no confidence in the further usefulness of those men and it is my intention to dismiss them from our service. We must respectfully decline to permit any further supervision of our relations with our employees by outside parties.

I cannot be responsible to the public for the safe operation of our railroads unless I am left with a free hand to determine what kind of employees shall be depended upon for such safety.

We desire to avoid trouble, but we do not intend to purchase peace at the price of permitting the Amalgamated Association any longer to keep our working forces in a state of turmoil. The attention of our men upon whose carefulness the safety of the public depends must not be distracted by the agitation fomented by the Amalgamated people.

I trust that it will be plain to your Honor and to the public from the letter of Mr. Mahon that what he and his followers are seeking is domination and control over our employees. The Court of Appeals has decided that this company "may refuse to employ workers who will not accept a condition or make an agreement that they will not join a particular union or combination of workers while in the plaintiff's employ."

The Amalgamated has sought unsuccessfully to break down that legal right through agitation, strikes and threats of strikes for the last twenty-three years, during which time our loyal employees have rendered

safe service to the public. All they ask now is to be let alone.

I desire to avert a strike which, as I have heretofore stated, may bankrupt the company, but I cannot safely operate this property partly Amalgamated and partly Brotherhood.

I thank you for your very fair conduct of this matter at all times and assure you of my great regret that I can see no other course to take.

A statement by the Brotherhood said in part:

The Amalgamated Association is threatening to call a strike on the Interborough lines.

At a special meeting of the general committee held this date, the executive committee was directed by resolution to notify every member of the Brotherhood that any employee who answers a call to strike will never again be admitted to membership in our organization, which means he cannot be re-employed by the Interborough Rapid Transit Company.

The Brotherhood intends to live up to the preamble of our constitution, which guarantees to the people of this city continuous, efficient railroad service.

Since Tuesday both sides have been marking time.

High-Speed Line Plan Before Milwaukee Council

Plans for the construction of Milwaukee's first subway, combined with an interurban service on private right-of-way were announced by S. B. Way, president of the Milwaukee Electric Railway & Light Company, and have been approved by the Mayor of Milwaukee and the Association of Commerce.

Mr. Way states that the company proposes to build a half-mile subway from the Public Service Building at Third and Michigan Streets to Eighth Street and St. Paul Avenue, to be connected with a new double-track system, partly elevated, tying in with its west-end rapid transit interurban lines at Fortieth Street. The entire length of the new system would be 2.8 miles. The cost of the project is estimated at \$4,000,000.

The Common Council will consider the proposal at its next meeting. If approved, Mr. Way stated that construction work would begin as soon as possible.

The project has been reviewed at length in the issues of *ELECTRIC RAILWAY JOURNAL* for Feb. 25, page 311, and March 3, page 351.

Special Rates Continued in Tacoma

Another 90-day extension of the special street car rates in Tacoma, Wash., has been filed with the department of public works by the Tacoma Railway & Power Company, continuing the rates until June 4. The special rates provide for three tokens for 25 cents with universal transfer privilege and weekly passes for 30 cents entitling the holder to ride for 5 cents.

Negotiations for Wage Contract in Memphis

Wage scale differences between the management of the Memphis Street Railway, Memphis, Tenn., and 450 employees are being worked out in accordance with plans mentioned in the March 3 issue of *ELECTRIC RAILWAY JOURNAL*. From a week to ten days will be spent in hearing testimony.

The men are asking for an increase of 9½ cents an hour for operators on two-men cars and 20 cents an hour for operators of one-man cars. The company is asking for a flat reduction all down the line. A two-year contract on which the present arbitration is functioning expires April 1.

New York Learns About the Mitten Plan Through the "Sun"

The New York *Sun* sent a reporter to talk with Thomas E. Mitten and to study the workings of the Mitten Management Plan. The results of that talk and study were set forth in four articles the first of which appeared in that paper on March 6. The series was announced by the *Sun* in an editorial headed "Can Philadelphia Teach Us?" as follows:

Sixteen years ago the transit lines of Philadelphia were in ruins. Strikes had impoverished the company, angered the men and antagonized the public. Bankruptcy was in plain sight. Then Thomas E. Mitten took charge to put into effect an idea—to take the workers into partnership with capital—make them allies instead of opponents in operating a public utility. He sought to set the men at work for their own prosperity.

Today Philadelphia's transit workers are paid more than any others in the United States. A stock once nearly worthless sells considerably above par. Dividends of 8 per cent are paid annually on the common stock. The Philadelphia public boasts about the service it has through a co-ordinated system of trolley cars, subway, elevated roads, motor buses and taxicabs.

Another study of Mr. Mitten was published in the New York *World* of March 8, 1928, under a heading "Trends in Industry."

Franchise Extension for Dallas Interurban

An extension until Dec. 31, 1928, of the franchise of the Dallas Southwestern Railway has been granted by the City Commission of Dallas, Tex. This company was organized several years ago for the purpose of constructing an interurban electric railway between Dallas and Irving. E. P. Turner is president and chief promoter of the project. The line would proceed through the West Dallas industrial district to Irving, about 15 miles.

Several times the company has been ready to proceed with construction and each time some difficulty arose to hinder it. Officials are convinced that they will be able to complete the line during the present year. Upon this representation city officials extended the franchise.

Would Increase Rate on Washington Line

An increase from 20 to 25 cents for a round trip fare on its line from the Treasury to the golf course, and Hains Point in East Potomac Park, has been sought by the Capital Traction Company, Washington, D. C., of the office of public buildings and public parks of Washington. Lieut. Col. U. S. Grant, 3rd, director of the office, said that it had been represented to him that the line was losing money, and that he did not want to see transportation facilities to that large recreation area abandoned on account of the losses. In his opinion, the increase was a reasonable one, amounting to less than 5 cents a mile for the 5½-mile round trip.

Another Franchise Extension in Chicago

Another day to day extension of the franchises of the Chicago Surface Lines, Chicago, Ill., was approved by the City Council on Feb. 29, as the fifth successive extension of the street car franchises expired. Like the previous extensions, the new one is on a day-to-day basis and not to exceed 31 days.

Active Welfare Work in New Jersey

How far the Public Service system, Newark, N. J., goes in administering comfort to its approximately 20,000 employees is outlined in a special article in the Feb. 15 issue of *Public Service News*, the official publication of the company. The Welfare Department has a well-defined duty to call upon those disabled, carrying a message of the company's interest, making pecuniary advances when necessary, bringing the case to the attention of a physician, arranging for admission to hospitals, sanitariums or state institutions, and attending to many other matters which the exigency of the case may require. Special emphasis is laid upon the prompt and full payment of benefits, cases of illness falling under the Welfare Plan for the payment of sick relief and cases of injury being cared for under the state workmen's compensation act.

A service annuity or pension is provided, the terms of which are so liberal that one may retire at the age of 65, after 25 years of service, upon a competence virtually amounting to half pay, while provision is made for those who become broken in health after being 12½ years in the employ of the company.

In addition the Public Service creates for the employee an estate through the welfare plan death benefit and the group insurance and further by compliance with the workmen's compensation act when death is the result of industrial mishap.

It was explained that with these forms

of protection, Public Service workers are assured of the equivalent of an estate fully administered and sufficient to carry the family over the adjustment period to the time when the economic status of the household becomes again firmly established.

L. S. Storrs Criticizes 5-Cent Zone Plan for Key System

Called as an expert witness by the Key System Transit Company at a fare hearing before Railroad Commissioner Clyde Seavey in San Francisco, Cal., Lucius S. Storrs, managing director of the American Electric Railway Association, characterized the proposed 5-cent zone plan for the East Bay cities as a hazardous experiment unless backed by a large treasury surplus. Mr. Storrs said the basic cash fare rate of a majority of American electric railways was 10 cents and he knew of no instance where a company had increased its net revenue by reducing the basic cash fare. The hearing was a resumption of the rate case which started last November when the Key System appealed the California Railroad Commission's 5-cent zone order, claiming that its effect would be bankruptcy.

Mr. Storrs took sharp issue with A. G. Mott, chief engineer of the commission and author of the 5-cent zone plan. Mr. Mott had testified that the 10-cent cash fare and \$1 weekly pass plan of the company would result in the loss of 75 per cent of the company's short riders. To which Mr. Storrs' rejoinder was that he could not see what justification Mr. Mott had for saying that 75 per cent or 21,200,000 short haul passengers would be lost by operation of the plan. He opined that not more than 5 per cent of short riders would be lost. R. T. Sullivan, manager of the Tacoma Railway & Power Company, another expert witness called by the company, testified that a higher fare would raise net revenues even though there was a falling off in patronage.

The final session of the hearing will be held March 16 in San Francisco.

Rearrangement of Stops Asked in Atlanta

A rearrangement of street car stops in Atlanta, Ga., to eliminate stops in the middle of the block is being asked by the North Boulevard Park Civic League of the Georgia Power Company and the matter has been taken to the Georgia Public Service Commission.

According to statements by the league officials, many of the stops are now located in the middle of the block, and away from street corners. These stops, they declare, often make "jay walking" compulsory if one is to catch a street car, and are very dangerous to children because of the heavy and rapid traffic at many of the stops as now located.

They favor the elimination of these stops in favor of those at street corners.

Relief for Rainier Valley Line

The City Council of Seattle, Wash., has passed a bill modifying the railway franchises of the Seattle & Rainier Valley Railway, relieving that company of future payments of 2 per cent gross earnings tax and of furnishing free transportation to policemen and firemen. The bill was introduced in the Council last December, about the time the arrangement was made whereby the Rainier Valley company agreed to honor transfers from the city lines and to sell tokens on its lines at the same rate as charged by the city. The bill had been held up pending efforts of Councilmen to get the railway to pave between its tracks on Rainier Avenue. Representation by Walter M. Brown that the company could see no time when it would be financially able to meet the costs of paving caused the Council to drop the attempt.

About \$75,000 owed to the city as back earnings taxes is being gradually wiped off the books through an agreement whereby patrons of the valley line are given transfers to municipal cars on token or 8½-cent fares.

New York Fare Case Put Over

Supreme Court Justice Callahan on March 2 adjourned until March 9 the hearing in connection with the three suits brought by the Transit Commission and the City of New York in the Supreme Court to restrain the Interborough Rapid Transit Company, New York, from putting 7-cent fare schedules into effect. The adjournment was granted at the request of E. D. Kyle, of the office of William L. Ransom, special counsel for the railway.

Baltimore Company's Vehicles to Aid Red Cross

The United Railways & Electric Company, Baltimore, has responded to a call sent out by the Baltimore Chapter of the American Red Cross and has offered that organization the use of a majority of its 110 passenger buses and 45 motor trucks in case of disaster in or near Baltimore. A Disaster Corps is being organized and the Red Cross is attempting to get truck and bus owners to offer the use of their vehicles.

St. Louis Prefers Pay-Enter

By a vote of 191,289 to 112,345 the patrons of the St. Louis Public Service Company, St. Louis, Mo., on Feb. 27 expressed a preference for the rear-entrance pay-as-you-enter system of collecting fares as against the present plant of front-entrance pay-as-you-leave. The vote was taken on the 949 cars of the old front and rear entrance type. A total of 1,129,189 passengers were carried during the day, but only 303,634 voted. Officials of the company said they would be guided by the vote.

Rapid Transit for Cleveland

\$40,000,000 System Being Discussed to Embrace High Speed Lines to All City Sections

Negotiations are under way between the Cleveland Railway, Cleveland, Ohio, and the Van Sweringen interests for a \$40,000,000 rapid transit system tapping practically every section of Cleveland and the territory immediately adjacent.

O. P. and M. J. Van Sweringen are the developers of Shaker Heights, exclusive Cleveland suburb, and railroad operators and owners. They are now building a \$60,000,000 railroad terminal in Cleveland, in connection with which they are planning rapid transit facilities.

They have asked the Cleveland Railway to submit propositions for the operation of five rapid transit lines radiating from their Public Square terminal. One is along the Nickel Plate right-of-way to the east, another is the existing rapid transit line to Shaker Heights, owned by the Van Sweringens and now operating partly on city tracks and partly on a private right-of-way, the third is along the right-of-way of the Erie Railroad to the southeast, the fourth is along the right-of-way of the Big Four Railroad to the southwest and the fifth is along the right-of-way of the Nickel Plate Railroad to the west.

ONE OF TWO PROPOSITIONS EXPECTED

The engineering firm of Coverdale & Colpitts has made a study of the situation for the Van Sweringens, while the firm of Parsons, Clapp, Brinkerhoff & Douglas is preparing a report for the Cleveland Railway, in which it is expected to make one of two propositions: (1) to lease the rights-of-way, lay the tracks, buy the necessary equipment and operate the rapid transit lines as part of the Cleveland Railway system, or (2) to offer to operate the rapid transit lines as a separate system on a cost plus basis.

Recently the Cleveland Railway concluded an agreement with the Van Sweringens to operate the existing Shaker Heights rapid transit lines on a cost plus 10 per cent basis. There are no transfer privileges between this line and the city car lines and the fare is 10 cents.

The projected rapid transit system will permit the abandonment of some street car lines and the shortening of others which are now losing money because of the length of the haul. New motor coach routes will have to be established to feed traffic into the rapid transit lines. The carrying out of the project will involve the purchase of millions of dollars worth of new equipment, including high speed trains, and must of necessity involve a mammoth grade crossing elimination program on the part of the railroads, particularly the Nickel Plate.

The survey being made by Parsons, Clapp, Brinkerhoff & Douglas started last August with traffic counts. Their report is due about April 1. It is expected to tell what effect the rapid transit lines will have on present electric railway and motor coach traffic, how

many passengers can be expected to utilize the rapid transit lines at the start and their origin, what changes in routing of street cars and motor coaches can be made to best advantage, what type of rapid transit trains will be most suitable and what rate of fare ought to be charged.

Cleveland has been talking about rapid transportation for years, but the proposition now under consideration appears to be the first that can be worked out to give adequate service on a satisfactory cost basis. Ten years ago the city awarded a subway franchise to a group of capitalists and established a rapid transit commission which had power to make tax assessments, but the entire proposition was voted down at a referendum.

Tunney Rides the Trolley in Grand Rapids

Gene Tunney, world's heavyweight champion, paid the electric railway industry a very pretty compliment recently, while visiting in Grand Rapids to address 10,000 boys on living clean lives. As he was greeted by Martin C. Carmody, chairman of the reception committee and supreme knight of the Knights of Columbus, Gene said: "This is the first time I was ever met by a reception committee and escorted through the city in a street car. I feel complimented."

The mighty mauler of the heavyweight division was so pleased with the electric rail coach to be used as his private car that he requested a photo of



"When Three Champs Meet"

Research Fellows to Be Appointed at Wisconsin

Two research fellowships in engineering are to be appointed on April 30 by the University of Wisconsin. Candidates must be graduates of engineering colleges of recognized standing, and preferably, should have had one or two years of graduate study, of teaching, or of engineering experience. Applications will be received up to April 15. Information and application blanks can be obtained from Dean F. E. Turneaure, College of Engineering, Madison, Wis.

The appointments will be for a period of two years, subject to satisfactory service, and the salary will be \$900 for the first year and \$1,100 for the second year. A fellow will be expected to devote not less than half time to assigned research in the College of Engineering, but will be given an opportunity to complete the requirements for a master's degree within the two-year period. The period of service will be the usual academic year, including the short vacations.

himself standing beside it in company with Mr. Carmody. Noticing the Charles A. Coffin medal insignia gracing the side of the coach Mr. Tunney smiled and said: "You might call this picture 'When Three Champs Meet'."

Then Gene was escorted through the crowd from the Union station in his spic and span coach for his ride to the Pantlind Hotel. During the ride the champion commented on the soft seats, the refinements of the coach and the easy riding qualities. He then went into the smoking compartment where he stood and waved greetings to the throngs on the sidewalks. The car proved its superiority over other vehicles for such receptions since it permitted the entire reception committee to ride in ease and converse with their guest during the trip.

After the trip Gene paid this tribute to street cars:

These cars certainly are in the championship class and the best I ever rode in. They are a "knock out" and a compliment to both the company that operates them and the city whose people they serve. With this car at my disposal I feel complimented.

Failure Predicted for New York Unification Legislation

Political wisecracks say that with the Legislature scheduled to adjourn on March 15, the prospect of action on the transit bills drafted for its consideration is far from promising. The plan of reorganization has been agreed upon by the Transit Commission and the Board of Transportation, and the provisions of unified operation of the rapid transit facilities of New York have been approved by representatives of the B.-M.T. lines. The bill embodying the proposal has not even been introduced.

Hearings on Illinois Terminal Case to Be Resumed

Hearings on the applications of the Illinois Terminal Company to lease the St. Louis, Troy & Eastern, St. Louis & Illinois Belt Line, St. Louis Electric Terminal and the main division of the Illinois Traction, Inc., will be resumed here on March 16, according to an announcement of the Interstate Commerce Commission. This action was taken to enable the receivers of the Chicago & Alton Railroad, who have intervened in the case, to prepare various exhibits in opposition to the lease.

Chicago Traction Negotiations Postponed Until April 10

Members of the Chicago City Council sub-committee on local transportation voted recently to discontinue their hearings on the proposed traction legislation until after the primary election on April 10. The subject was said to have become too deeply involved in politics to warrant any further effort to complete

the draft of the legislative bills and to frame a new ordinance. Because of the committee's decision, it is now thought improbable that anything more can be accomplished toward settling the problem until the next regular session of the legislature in 1929.

32,000 Bought Sunday Passes on Feb. 26

The fact that only 23,000 persons purchased 25-cent unlimited ride tickets on Washington's Birthday, Feb. 22, has caused officials of the St. Louis Public Service Company to conclude that the patrons do not desire a concession of this kind on week-days. The passes were tried out on Washington's Birthday with a view to obtaining an expression from the car riders. The passes are being used on Sundays by an increasing number of car riders. On Sunday, Feb. 26, more than 32,000 persons purchased the 25-cent tickets. On the first Sunday the passes were sold only 20,000 used them. The plan has now been in vogue for six weeks and each week has shown a gain over the preceding Sunday.

Good Response to "Suggestion Letter" in North Carolina

The best "suggestion letters" from employees of the North Carolina Public Service Company in the Greensboro, High Point and Burlington districts were rewarded recently with three prizes of \$15, \$10 and \$5. Fifty-one suggestions were turned in. M. P. Bullard, order dispatcher, W. F. Hammer, electric line superintendent, and S. J. Rink, railway operator, were the winners in the January contest.

Traffic Study Planned in Baltimore

Plans to organize for the purpose of making a study of traffic conditions in Baltimore, Md., including the subject of one-way streets in the downtown section, are being made by a special commission appointed by Mayor William F. Broening. The United Railways & Electric Company, is represented on the commission by Dean J. Locke, staff engineer. Charles F. Goob, chief engineer of the city, has been designated as chairman. Appointment of the commission was authorized by the City Council.

One of the first acts of the body will be to make a study of the report made by Kelker, Deleuw & Company, Chicago, traffic experts who made a survey of the city a few years ago. A large part of the expense of this survey was borne by the United Railways & Electric Company.

Positions Abolished in Retrenchment in Detroit

In line with a recent announcement that economies would be effected by the abolishing of positions in the organization of the Detroit Department of Street Railways, Detroit, Mich., the duties of which overlapped those of other positions, the position of chief investigator held by John Moritz has been abolished by the department. It is understood that the work formerly done by Mr. Moritz is being assumed by Rufus G. Lathrop, secretary to the Street Railway Commission and chief of the insurance distribution branch of the municipal railway system. In addition to acting as head of the department's investigation division for the past two years, Mr. Moritz has done special investigating

Report for 1927 of Accidents on Street Railways in Pennsylvania compiled by the bureau of accidents of the Public Service Commission of the Commonwealth of Pennsylvania

DISTRIBUTION OF ACCIDENTS													
Number of Acci- dents	Cause of Accidents	Employees		Passengers		Trespassers		Others		Total		Per Cent	
		Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
117	Collision of cars.....	2	5	1	543	.....	.....	.....	1	3	549	2.13	12.72
33	Grade crossings (other than streets).....	.....	1	.....	5	.....	.....	10	57	10	63	7.09	1.46
990	Collision of car and vehicle (not at grade cross- ings).....	.....	6	.....	298	.....	1	38	1,157	38	1,462	26.95	33.87
65	Derailments.....	.....	3	.....	156	.....	1	.....	21	1	182	.71	4.22
10	Contact with overhead or side obstruction.....	.....	1	.....	6	.....	2	.....	1	.....	10	.....	.23
5	Contact with trolley or feed wire.....	.....	1	.....	1	.....	.....	1	3	1	5	.71	.12
54	Defect or failure of roadway or equipment.....	.....	2	.....	58	.....	.....	.....	2	.....	62	.....	1.44
96	Persons caught by folding doors.....	.....	.....	1	95	.....	.....	.....	.....	1	95	.71	2.20
153	Persons boarding standing cars.....	.....	1	.....	152	.....	.....	.....	.....	.....	153	.....	3.54
507	Falling from car.....	.....	5	2	483	.....	17	.....	.....	2	505	1.42	11.70
394	Falling within cars.....	.....	1	.....	393	.....	.....	.....	.....	.....	394	.....	9.13
26	Jumping on or off while in motion.....	.....	2	.....	21	.....	3	.....	.....	.....	26	.....	.60
677	Struck by car.....	.....	6	.....	7	.....	14	63	584	83	594	58.86	13.75
70	At elevated or subway platforms.....	.....	.....	.....	.....	.....	.....	.....	63	.....	70	.....	1.66
14	Repair work on right-of-way.....	.....	14	.....	.....	.....	.....	.....	.....	.....	14	.....	.32
135	Miscellaneous.....	.....	30	.....	86	.....	1	.....	16	2	133	1.42	3.08
3,346	Total.....	8	72	5	2,304	16	36	112	1,905	141	4,317	100.00	100.00
Per cent of total killed.....		5.67	.....	3.55	.....	11.35	.....	79.43	.....	100.00	.....	.....	.....
Per cent of total injured.....		.....	1.67	.....	53.37	.....	.83	.....	44.13	.....	100.00	.....	.....

COMPARISON OF YEARS 1926 AND 1927			KILLED				INJURED					
	Per Cent		1926		1927		Difference		Difference			
							Per Cent			Per Cent		
Decrease of 94 accidents, or.....	3		9	8	1 Decrease.....	11	99	72	27 Decrease.....	28		
Decrease of 8 killed, or.....	5		7	5	2 Decrease.....	28	2,262	2,304	42 Increase.....	18		
Decrease of 225 injured, or.....	6		19	16	3 Decrease.....	16	25	36	11 Increase.....	44		
			114	112	2 Decrease.....	2	2,186	1,905	281 Decrease.....	13		
			Total.....	149	141	8 Decrease.....	5	Total.....	4,572	4,317	255 Decrease.....	6

work for the corporation counsel's office. The position of staff engineer, formerly held by Charles E. Hewitt at \$8,000 per year, has also been abolished. This position was created about a year ago at the suggestion of one of the com-

missioners, but according to other department heads has not been justified.

The reorganization which has been going on during the past few months is expected to result in a saving of nearly \$300,000 per year in salaries alone.

\$1,225,000 Improvement at Oklahoma City

Local railway to build electrified belt line to help increase freight revenues. Location of industries along belt line encouraged

ONE OF the big improvements to be completed by the Oklahoma Railway, Oklahoma City, Okla., within the next few months is a freight-carrying electrified belt line extending around the northwestern, western and southern environs of Oklahoma City. This line will connect the company's Oklahoma City-El Reno interurban with the line from Oklahoma City to Norman eliminating the necessity of hauling through freight along the former route on Classen Boulevard in Oklahoma City. The line is to cost approximately \$1,225,000. The company now has cars sufficient to meet the requirements of the new line.

The proposed line is a result of a desire of Hubert Hudson, president, and other new owners of the company, who purchased it while it was still in receivership, to increase revenues from freight sources and also to please residents along Classen Boulevard who had objected to the interurban tracks on that thoroughfare being used for freight hauling purposes.

When the receivership was lifted and the new owners assumed control late last year, the plan for the belt line was worked out and finally financed. The matter was taken up with the City Council early in January, but the many complications over right-of-way and other matters caused a delay in the approving of the contract by the City Council until Feb. 15.

After the contract was approved by the Council some of the Classen Boulevard residents discovered that the contract, while it provided for removal of through freight traffic from Classen Boulevard, retained for the company the right to haul its own materials on the line and provided for the retention of a freight spur near 25th Street and Classen Boulevard. The Classen Boulevard objectors, insisted on having freight hauling eliminated entirely from this street. About 50 of these objectors appeared before the City Council and the Mayor promised to withhold his signature until this matter could be adjusted.

Although all other disputes and difficulties had been settled on March 3 the adjustment between the Classen Boulevard people and the railway had not been accomplished and the contract was still unsigned. The railway, however, showed its faith by beginning to assemble material and starting construction at some points.

The belt line was desired by the city authorities, the railway and practically all residents of Oklahoma City, but many difficulties had to be overcome before an agreement could be reached. Many of these pertained to securing the right-of-way. A few months ago Oklahoma City voted \$10,000,000 in bonds for the removal of the tracks of the Chicago, Rock Island & Pacific Railway from the business center of the city to a location farther south and for straightening the river channel, building bridges and viaducts and other improvements. The southern portion of the Oklahoma Railway belt line project will extend into the district where the Rock Island tracks are to be removed and where some of the river channel and bridge work is to be done.

The first disagreement arose between the Rock Island Railway and the Oklahoma Railway over the locations of lines, rights of building switches to certain industries and other conflicting matters. Included in the bond issue was a provision for a viaduct on Exchange Avenue which is to be constructed at or near the point where the new right-of-way of the Rock Island Railroad and of the Oklahoma Railway belt line would be located. Finally it was agreed that the Rock Island Railroad, the Oklahoma Railway and the city should join in the expense of constructing the viaduct. The city owned titles also to several parks, one of which had been held in trust by the city to be used exclusively for railroad terminal purposes. As the title to the city contained reversionary clauses applying in case the property was not used for railroad terminal purposes, it was necessary to file condemnation suits to clear the titles. The company has also filed several other condemnation suits involving land owned by individuals.

The matter of locating the belt line far enough from the city limits to prevent it from becoming a menace to future growth of the city was also considered and adjusted. Objections raised by some of the residents of south Oklahoma City against grade crossings at certain streets near the river caused another delay. The Oklahoma Railway, however, promised to separate the grades on these streets and the difficulty was removed.

The new belt line will also be utilized by the Oklahoma Railway to transfer freight to steam railroads passing

through the city. Cheap industrial sites have been arranged along the belt line to encourage the location of industries and increase freight revenues.

Bandits Rob Columbus Employees

After kidnapping two truck drivers and a watchman, employees of the Columbus Railway, Power & Light Company, four masked robbers drove them to an alley of Franklin Park South, Columbus, Ohio, on March 4, and stole 10,000 detached street car tickets and about \$150 in cash. The money and tickets were the receipts for the preceding day from the Main and Neil and Oak lines. Later in the day the tickets, some transfers and money boxes were found along the roadside near Agler and Burwell Roads.

Fare Decrease in Muskogee Granted

Authority to reduce the city railway fares in Muskogee from 10 cents cash fare, 3 tokens for 25 cents, to 10 cents cash fare, 2 tokens for 15 cents was granted the Muskogee Electric Traction Company on Feb. 24 by the Oklahoma Corporation Commission. The application had the endorsement of the city manager and the chamber of commerce of Muskogee.

Foreign News

Glasgow to Allow Ads in Cars

After holding out for nearly 40 years against allowing advertisements on its street cars, the Glasgow Town Council, Glasgow, Scotland, recently voted to consider bids for advertising rights on the corporation street cars. An offer has been made which represents a payment of practically \$5,000 weekly for exclusive rights. The sub-committee has recommended acceptance of this offer, stipulating, however, that the advertisements shall be confined to the upper partitions of the inside windows and must be of a transparent character.

The committee recommends that sanction be refused to any announcement containing scripture texts, political matter, or reference to alcoholic liquors. It is expected that with these reservations the corporation will accept the offer.

Trackless Trolley Line for Prague

Trackless trolleys will be installed in Prague, Czechoslovakia, on a route where the former street car service has been discontinued, according to the president of the board of directors of the Prague Electric Railway Administration.

The new cars will be so arranged that they can turn out five meters, almost 16½ ft., on either side of the trolley wires. If they prove successful it is expected that their use will be extended.

Electrification in Natal, South Africa

The largest main-line electrification in the British Empire is said to be a route mileage of 175 on the main line between Glencoe and Pietermaritzburg in Natal. According to the report of Sir William W. Hoy, general manager South African Railways and Harbors, electric locomotives on this line are showing notable superiority to the former steam equipment. They are available during practically 90 per cent of the time as compared with not more than 50 per cent for the steam locomotive. They are averaging 7,000 miles per month as compared with 2,700 for the steam locomotive, and some of the units have already done 75,000 miles without heavy overhaul. Steam locomotives frequently had to be withdrawn from service for heavy repairs after a run of from 25,000 to 30,000 miles.

Republic of San Marino to Construct Railway

Plans are now being made for the construction of an electric railway connecting the capital of the Republic of San Marino, Italy, with the city of Rimini on the Adriatic Sea. The cost of the railway is to be borne jointly by the governments of Italy and San Marino.

San Marino which was founded in the fourth century, is said to be the world's oldest independent state. Hitherto access to the republic has been by carriage or motor, the road distance from Rimini being about 20 miles. The new line will facilitate commercial and industrial relations between the ancient republic and the surrounding kingdom.

Buses Installed in Beira

Trolley services in Beira, Portuguese East Africa, are to be augmented by buses. The Urban Commission of Beira has asked for bids for the privilege of operating a bus line in the city and its environs.

The new bus service, which is planned to eventually replace trolley service in the city, provides for eight buses for whites and two for colored, with one to be held in reserve. The franchise is to be exclusive for a five-year period, unless the licensee is fined for breaches of the provisions of the contract three times, in which event it becomes void. The fares are to be approved by the commission and all employees in contact with the public are to be white Portuguese.

Birmingham Development

The tramway and bus department of the city of Birmingham, England, has opened a new depot with accommodation for 70 tramcars and 30 buses. The new building is required on account of tramway and bus developments. The cost of the depot, which covers 2 acres, is £37,000.

Recent Bus Developments

Permit Refused for Staten Island

Commission insists bus company awarded franchises from city shall prove its financial and operating responsibility

APPLICATION made by the Tompkins Bus Corporation for a certificate of convenience and necessity to operate buses on eighteen routes in Staten Island was denied on March 7 by the New York Transit Commission. The company sought a certificate after it had been granted franchises by the Board of Estimate last July. Issuance was opposed chiefly by the Staten Island Rapid Transit Company, which protested that the new lines would duplicate its service. Commissioner Godley said:

In my opinion, this commission should not grant the certificate to and approve the exercise of a franchise by a corporation which neither has nor can procure sufficient funds to finance the enterprise. The people of Staten Island, if they are to have legalized bus operation, are entitled to have the operation conducted by a company of sufficient financial ability to furnish modern equipment and efficient service.

The president of the applicant company testified that if the certificates were granted the applicant intended to issue \$500,000 in equipment notes to be sold at a price to net the company about 96 and \$500,000 in 7 per cent preferred stock to net the company 90. With the money thus secured, the applicant intended to spend \$600,000 for new equipment; about \$125,000 for new garage facilities and, after the payment of certain equipment notes now outstanding, have left \$100,000 for working capital.

Although the applicant promised from time to time to produce responsible people who would undertake the financing and although numerous adjournments were granted to enable it to produce such proof, the evidence was never offered and the applicant finally rested with the production of its balance sheet as of Nov. 15, 1927.

The balance sheet referred to showed that the company, which has been operating buses on the proposed routes for some time, had quick assets of \$62,677 and quick liabilities of \$42,077. But, it was shown, a claim of \$30,000 had been made against the managers, the value of which was not made clear and that the company owed \$147,000 on equipment in use.

Minthorne T. Gordon, Jr., president of the company, admitted that most of this equipment still unpaid for would have to be replaced with new equipment to be purchased by funds raised under the proposed financing plan. The old equipment had been either purchased on conditional sales agreements or rented with an option for purchase.

The opinion concluded:

In short, the proof adduced shows that the applicant has no funds with which to finance the operation which it has undertaken under its franchise and has no definite plan for procuring such funds.

In my opinion, no certificate should issue

unless the applicant shows such ability and resources as will give some assurance that the operator will furnish efficient service commensurate with public needs. I therefore recommended that the application be denied.

The Tompkins Bus Corporation is now serving at a 10-cent fare parts of the territory where once the city's municipal trolleys operated at a 5-cent cash fare but at a cost to the taxpayers of 12 cents for each passenger handled.

Wherry & Wight were counsel for the railway and Fisk & Roberts were the consulting engineers.

Regulations Drawn Up By Georgia Commission

A list of important regulations has just been drawn up by the Georgia Public Service Commission and submitted to the different bus operators in the state for their consideration before being definitely put in force.

One regulation provides that a bus driver who drinks liquor on or off duty forfeits his right to employment as a bus driver within the state. Another requires that all drivers be carefully examined and their ability to drive a bus tested. A third provides for the careful inspection of every vehicle by a competent mechanic between each trip. Other regulations provide for a speed not to exceed 40 m.p.h.; that drivers give their undivided attention to driving while on duty, making it unlawful for them to talk to passengers or for passengers to talk to them; that, in case of a breakdown, provision be made to transport the passengers to their destination, and that accidents be immediately reported to the commission.

Other clauses include indemnity insurance for the protection of passengers and property, the filing of fare schedules and operations, and the submitting of regular fiscal reports to the commission. Some weeks ago the commission asked all operators of bus lines in Georgia to file reports giving necessary details of their business.

Decision Hits Illinois Gas Tax

Illinois' brief experiment with a 2-cent state gasoline tax, enacted by the 1927 Legislature, came to an abrupt end recently when the State Supreme Court rendered a decision that the law under which the tax was collected was unconstitutional. The court held that the statute violated the state constitution on several grounds; namely, that it was discriminatory, that it amounted to a double tax on motorists, and that it was misleading in that it failed to state that the levy was upon users of the highways and not upon gasoline. In conclusion the court characterized the tax law as "an unintelligible piece of legislation," and declared that those upon whom the

law imposed the duty of collecting the tax "could not tell their duties from reading the law."

It is estimated that since the law became effective last August, motorists have paid in to the state treasury more than \$7,000,000, approximately \$3,400,000 of which was collected in Cook County, the seat of which is Chicago.

Regulation Requested in Tennessee

Regulation of buses and trucks by the State Railroad and Public Utilities Commission was requested in a petition filed with the commission recently by Richard D. Gleaves, attorney for the Tennessee Motor Carriers Association. The petition, after citing various laws which apply to the authority of the commission, asks:

1. That the commission exercise the jurisdiction given them by the various statutes.
2. That it assume control, regulation and supervision of all the public utilities engaged in the business of transporting freight or passengers for hire in the state.
3. That it require all companies to operate vehicles on regular schedules.

The petition states that several recent accidents may be traced to the fact that buses operating in competition have been run at excessive speed in order to arrive ahead of their rivals, and that this has become a practice dangerous to the passengers as well as other vehicles on the roads. The petition was accompanied by an opinion from L. D. Smith, attorney-general of the state, to the effect that the state commission had authority to exercise regulation over the bus lines.

Debate on Bus Bill in Virginia Legislature

By a vote of eighteen to four, the Virginia Senate on March 3, passed the rate-fixing bus bill which nullifies the value of certificates as the basis of rate fixing, except the actual cost thereof.

The bill now goes to the house for concurrence but in view of the fact that the house committee already has twice refused to report out the identical bill, action of the lower body is problematical. In practical effect, the bill would prohibit the state corporation commission, in fixing the bus rates to be charged patrons, from placing any value on the certificates issued beyond the nominal actual cost of the transaction which supporters declared to be \$1.50.

Coach Permit Sought in San Diego

The San Diego Electric Railway, San Diego, Cal., has applied to the Railroad Commission for authority to operate auto stage service connecting La Mesa, Lemon Grove and intermediate points.

Bus Expansion for Ohio Valley

Sale of the Interstate and Cannon Ball Bus companies to the Southern Gas Securities Company, Chicago, a subsidiary of the Central Public Service Corporation, has been concluded. The Central Public Service Corporation recently purchased the Ohio Valley Electric Railway, the Portsmouth Public Service Corporation, and the Ohio Valley Bus Company from the American Gas & Electric Company by virtue of the bus purchase completed at Portsmouth. It now controls all of the urban and interurban transportation systems in and between Huntington and Portsmouth. Its bus lines connect Charleston and Columbus, Ohio, Huntington, Portsmouth and Chillicothe, Ohio. The total mileage of the several companies is 202 miles.

Solution of a serious transportation problem will be afforded by the transaction, Mr. Brady, vice-president of the Central Public Service Corporation, indicated. For some time a rate war had been waged with the Cannon Ball and the Interstate bus companies and the Portsmouth Public Service Company, with what Mr. Brady characterized as the usual disastrous results. He said that that section of Ohio Valley had a great industrial future, and that there was a necessity for dependable and adequate transportation. The two services would be co-ordinated with the Portsmouth Public Service Company and the Ohio Valley Bus service between Portsmouth and Huntington on both sides of the river and a thorough study made of the needs of the various communities served. Fred W. Samworth, formerly general superintendent of the Ohio Valley Electric Railway and of the Ohio Valley Bus Company, was made district manager of the Ohio Valley Electric Railway and of the Ohio Valley Bus Company and would also be manager of the Cannon Ball and Interstate bus companies.

Mr. Samworth indicated that no changes in the service in Huntington were contemplated. The three bus lines will continue to operate separately. No curtailment of electric interurban service is proposed as far as the Ohio Valley lines are concerned. However, it will be the policy of the company to curtail electric railway service between Ironton and Portsmouth and increase bus traffic.

15-Cent Bus Fare May Be Asked in Kansas City

The Kansas City Public Service Company, Kansas City, Mo., is preparing to submit to the City Council an outline of its plans for a more useful routing of buses, coupled with a 15-cent fare for the trunk lines to make them self-supporting. It is planned to leave the bus fare on feeder and crosstown lines at 10 cents, with a transfer privilege to street cars.

The policy of the company from the start has been to develop feeder lines in unserved districts, but to seek trunk

lines which would pay their own way. The company takes the stand that where bus and rail lines parallel, bus riders should pay a fare that will make the vehicle self-sustaining.

In all probability there will not be radical changes in the routings. It is expected that the Country Club Express, with a 25-cent fare, will be replaced with a Broadway bus line, with regular equipment and regular fare. This line may bend eastward at 55th Street to replace the south end of the Warwick line, which it is believed would pay if it did not extend south of 47th Street.

Past patronage makes it doubtful whether the railway will continue the northeast bus line under the 15-cent fare plan. Another northeast line extended along some eastern traffic lane may replace it, to tie in all railway lines in that section. A crosstown line some distance south of 39th Street has been discussed, and home owners on South Oak Street have sought a feeder line.

Substitution on Line in Quincy

Authorization has been given the Illinois Power & Light Corporation by the City Council of Quincy, Ill., to abolish railway service on the Fifth Street line and to substitute bus service. Ralph E. Carley, general manager, of the western division of the utilities corporation, has petitioned the Illinois Commerce Commission to approve the change and as soon as it is formally granted the tracks will be torn up and bus service started. The company has agreed to repave the streets along which its track has been located.

Opposes Curtailment in Atlanta

Citizens of the South Boulevard, Sylvan Mills, and Center Hills sections of Atlanta, Ga., have entered a protest with the Atlanta Coach Company against any curtailment of service. The present schedule on week-days begins at 5.30 a.m. and continues until 11.30 p.m., but the company proposes to change to a schedule beginning at 6.20 a.m. and continuing until 8.45 p.m. On Sunday it is proposed to operate the buses between the hours of 11 a.m. and 7 p.m.

The Georgia Power Company, which is operating the buses, states that the amount of traffic secured does not justify the schedules now maintained. On the other hand, citizens of these sections claim that curtailment would be very inconvenient, if it did not actually work a hardship upon many.

New Line Wanted for South Bend

Petition for the establishment of a new bus line which will serve the recently developed section on the west of South Bend, Ind., has been presented to the Indiana Public Service Commission by George R. Green, general superintendent of the Chicago, South Bend & Northern Indiana Railway. The new line will be an extension of the city electric railway service.

Financial and Corporate

Sioux City Property Sold

The plant and equipment of the railway at Sioux City, Ia., has passed from the control of the United Gas Improvement Company to that of the American Electric Power Corporation, New York, in a \$10,000,000 deal. The transaction also included the new \$3,500,000 power plant at Riverside, a Sioux City suburb; a \$1,000,000 addition now under construction; all wire and plant facilities in Sioux City, the gas plant and main system, the new \$300,000 service building at Dace and Court Streets, and several hundred miles of high tension power lines serving approximately 100 towns and cities in northwest Iowa.

The Sioux City properties and outside power lines were operated by the Sioux City Gas & Electric Company, a subsidiary of the United Gas Improvement Company, while the New York corporation, which made the purchase, operates in Iowa under the name of the Iowa Public Service Company. Its headquarters are at Fort Dodge.

The United Gas Improvement Company has held a majority of the stock of the Sioux City Gas & Electric Company since 1889.

C. I. Crippen, vice-president of the American Electric Power Corporation, has announced that W. J. Bertke, president of the Sioux City concern, will continue in that capacity.

R. M. Feustal a South Shore Director

At the annual meeting of the Chicago, South Shore & South Bend Railroad in Chicago on Feb. 28, Robert M. Feustal, Fort Wayne, president of the Indiana Service Corporation, was elected a member of the board of directors. He succeeds P. A. Erlach, resigned.

Preferred Dividends in Gary Quarterly

Dividends on the class "A" preferred stock of the Gary Railways, Gary, Ind., subsidiary of the Midland Utilities Company, will hereafter be paid quarterly at the rate of \$1.80 per share on June, September, December and March 1 to stockholders of record of the twentieth day of the preceding month. Previously monthly dividends of 60 cents were paid.

Interstate Issue Offered

An offering of \$12,554,000 first mortgage and refunding 4½ per cent gold bonds, series F, of the Interstate Public Service Company, Indianapolis, Ind., due March 1, 1958, has been made by a syndicate headed by Halsey, Stuart & Company. The bonds, due March 1, 1958, are priced at 94½ and interest.

Proceeds from these bonds will be used toward reimbursing the company for refunding bonds bearing higher coupon rates and for other corporate purposes. The issuance of these bonds has been authorized by the Public Service Commission of Indiana.

Maturing Note Issue of North Shore to Be Converted

The Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., has called a special meeting of stockholders for May 15 to vote on a proposal to convert \$2,684,208 of non-interest bearing notes due June 30, 1928, into 6 per cent non-cumulative preferred stock.

Claims Questions Up in Indiana Interurban Settlement

Claims against the Union Traction Company, Anderson, Ind., due to deaths or injuries were heard in Circuit Court at Anderson, Ind., following a hearing on an agreement of three classes of other claims. Some of the claims were for persons killed or injured in a collision of interurban trains near Alfont, Ind., on Feb. 2, 1924. A proposition by bondholders to many creditors, and said to have been approved by the court, provides that 87½ cents on the dollar be paid on \$238,000 of claims that accrued six months prior to the appointment of a receiver for the company on Dec. 31, 1924; 20 cents on the dollar on claims that accrued more than six months prior to the receivership, of which there are \$73,000 and 10 cents on the dollar on \$23,500 of claims that accrued more than a year prior to the receivership.

Net Income Increases in Philadelphia

\$13,010 transferred to surplus of P.R.T. in 1927. 961,618,543 passengers carried on all types of equipment, including bus and taxi

AFTER providing for all charges including a 7 per cent dividend on its preferred stock and an 8 per cent dividend on its common stock \$13,010 remained to be transferred to the surplus of the Philadelphia Rapid Transit Company, Philadelphia, Pa., for the year ended Dec. 31, 1927. The net income was \$3,782,184, compared with \$3,027,694 in 1926. These facts were disclosed in the annual report to the stockholders dated Feb. 29, 1928.

Passenger revenue for 1927, including subway-elevated, street car, bus and taxicab, was \$56,070,709. Operating expenses and taxes were \$43,321,422. Gross passenger earnings were \$1,125,901 less than 1926. This is accounted for partially by a natural local reaction following the Sesqui year, and partially

by the condition of industrial depression which began to be felt during the past summer.

At the close of 1927 the company was operating 664 miles of surface track, 39 miles of elevated and subway track, 243 miles of city bus routes, 1,285 taxicabs, and a fast growing system of intercity bus routes. By thus co-ordinating every phase of Philadelphia's public transportation, Mitten Management protects the joint city-company system against the inroads of competitive operation.

The Philadelphia transportation system has become a vast combination of many lines serving many communities. Pennsylvania bus lines, owned jointly by P.R.T. and Public Service Railway of New Jersey, extend across the Delaware Bridge to serve the residential

INCOME ACCOUNTS OF PHILADELPHIA RAPID TRANSIT SYSTEM

Compared by ELECTRIC RAILWAY JOURNAL	1927	1926
Gross passenger earnings...	\$56,070,709	\$57,196,610
Other operating revenue....	857,437	830,942
Total.....	\$56,928,146	\$58,027,552
Maintenance and depreciation.....	8,958,698	9,278,331
Power operation.....	3,385,004	3,613,393
Conducting transportation.....	20,093,203	20,566,841
General, including accidents.....	7,577,752	8,047,590
Taxes, including paving tax.....	3,306,762	3,409,097
Total.....	\$43,321,421	\$44,915,254
Operating income.....	\$13,606,724	\$13,112,298
Non-operating income.....	980,917	707,505
Total.....	\$14,587,642	\$13,819,803
Frankford Elevated rental and sinking fund—city contract.....	960,199	867,610
Total.....	\$13,627,443	\$12,952,193
Fixed charges and dividends.....	\$13,614,432	12,931,908
Surplus.....	\$13,011	\$20,285

STATEMENT OF CAPITALIZATION AND INDEBTEDNESS OF THE PHILADELPHIA RAPID TRANSIT COMPANY AS OF DEC. 31, 1927

	Paid In	Unpaid	Total
Capital Stock			
Common.....	\$29,996,235	\$3,765	\$30,000,000
7 per cent cumulative preferred.....	22,977,200	22,800	23,000,000
Total.....	\$52,973,435	\$26,565	\$53,000,000
Funded Debt:			
Collateral trust 5 per cent bonds due 1957			\$4,015,000
Sinking fund 5 per cent gold bonds due 1962.....			556,000
Sinking fund 6 per cent gold bonds due 1962.....			8,893,000
Equipment trust:			
Series "D" 1919-1929.....			18,000
Series "E" 1919-1929.....			58,000
Series "F" 1922-1932.....			1,500,000
Series "G" 1923-1933.....			2,850,000
Series "H" 1924-1934.....			1,890,000
Series "J" 1926-1936.....			1,530,000
Real estate mortgage.....			150,000
Total.....			\$21,460,000

sections of south Jersey tributary to Philadelphia, thus minimizing the occupation of the Philadelphia streets by independent bus operators. The P.R.T. and P.S.R., through this joint ownership, share equally the receipts and expenses applicable to what might be termed the local Philadelphia and Camden territory. P.S.R. stipulates the timetables for the suburban territory beyond Camden, and, under a special operating agreement, assumes the receipts and expenses thereof.

Bus service over the Delaware Bridge was started in the belief that it would eventually be a valuable aid to the P.R.T. city-wide system. Such service is justified, for the reason that if P.R.T. had not itself supplied the service, independent operators would have increasingly invaded the Philadelphia territory.

The acquisition of the Yellow Cab Company in 1926 served to preserve to the city-wide transportation system the revenue from the profitable short riding business which the cruising taxicabs were winning from the surface car lines, and at the same time capitalized the

STATEMENT OF INCREASED RIDING IN PHILADELPHIA

Calendar Year	Revenue and Transfer Passengers	Rides per Capita
1910.....	443,204,502	288
1911.....	517,697,478	329
1912.....	549,674,683	343
1913.....	580,011,057	357
1914.....	581,297,949	352
1915.....	594,220,409	354
1916.....	669,008,258	392
1917.....	726,936,340	419
1918.....	763,008,395	432
1919.....	866,944,336	483
1920.....	908,482,135	501
1921.....	836,547,351	451
1922.....	848,883,512	450
1923.....	918,775,871	480
1924.....	913,855,751	469
1925.....	926,928,994	468
1926.....	966,469,223	480
1927.....	935,412,879	457
Co-ordinated System, incl. Bus and Taxi, 1927.....	961,618,543	470

ride downtown and back on subway-elevated or street car. During the year 1927, 135,000 automobiles were parked in the 69th and Market Streets parking area, an increase of 55 per cent over the year 1926; 75,000 automobiles were parked in the Frankford Avenue and Bridge Street parking area, an increase of 27 per cent over 1926. In the latter part of the year arrangements were made with the Camden Bridge Garage whereby motorists might park their cars in this garage and receive, in return for a nominal fee, tickets entitling them to ride via Pennsylvania buses from Camden to the Philadelphia business district and return.

Based upon the experience gained and the great advantage already secured in now keeping more than 1,000 motors each business day out of the downtown district, and preparatory to the operation of the Broad Street subway, this management has made plans for the early erection of a garaging-terminal building at the Olney Avenue end of the subway. This garage will be modern and efficient in every respect, will have a capacity of 500 cars, will be constructed over the top of the company's present surface car loop, and will afford convenient access to the subway station directly beneath the building. The company is also urging the use of the public garages so that the public thoroughfares be left free for public transportation in vehicles which efficiently utilize the highway space.

In spite of the greatly increased congestion of the streets due to the increasing use of motor vehicles, the company has established during the past year a noteworthy record in the reduction of accidents. Accidents on the surface system have been reduced 21.2 per cent under the record of 1926. Accidents per 100,000 car-miles in 1927 were 52.76 compared with 63.98 in 1926, a reduction of more than 17 per cent. The record of cars pulled in for mechanical failures was but 0.335 per cent of cars operated. Car collisions, a type of accident already infrequent on P.R.T. system, were still further reduced 49 per cent during the year. There were 139—including a period of ten consecutive—no-collision days.

The increasing need for new and modern general shops to replace the

present shop facilities and permit more economical handling of maintenance and repair work has been felt by this management for some years. This much needed facility has been postponed from year to year to permit the use of available funds for extended and improved service to the public. P.R.T. has now acquired a tract of land admirably suited for this purpose located near Second Street and Olney Avenue, and will develop its general shop plans forthwith.

P.R.T. general offices were established in the new Mitten Building at Broad and Locust Streets on June 1, 1927. The centralization of all office work under one roof releases many quarters heretofore so used throughout the city and has already made possible substantial economies and efficiencies. Mitten Building also houses the Mitten Bank Industrial Section, Mitten Bank Securities Corporation, and Mitten Management.

The company has been in the forefront of the movement toward a wider distribution of the ownership of indus-

INCREASED RETURNS TO STOCKHOLDERS OF THE PHILADELPHIA RAPID TRANSIT COMPANY

Year	P. R. T. Surplus	Dividends on P. R. T. Stock Preferred, Per Cent	Common, Per Cent
1910. Deficit \$1,118,609			
1911.....	358,250		
1912.....	260,236		
1913.....	676,849		
1914.....	930,564		
1915.....	1,128,017		
1916.....	2,987,975		\$1,348,656-4
1917.....	4,345,900		1,499,277-5
1918.....	4,482,119		1,499,290-5
1919.....	4,482,532		1,499,290-5
1920.....	4,195,356		
1921.....	5,748,980		
1922.....	5,640,664		1,799,148-6
1923.....	5,616,833		1,799,148-6
1924.....	5,652,582		1,799,575-6
1925.....	6,178,916	\$60,871-7	2,399,639-8
1926.....	6,489,188	607,766-7	2,399,644-8
1927.....	7,007,436	1,369,531-7	2,399,644-8

growing desire of the traveling public for a speedier and more personal type of service. During the year the company added the Cunningham and Diamond cab companies. These companies are being merged with the Yellow Cab Company, thus assembling virtually all local taxicab operations under one management and paving the way for substantial benefits and economies which are already going far toward offsetting losses from bus operation.

The report refers to the Public Service Commission studies of Philadelphia's transportation system and to the recommendations since carried out by the company.

On the subject of traffic congestion the report mentions the vast improvement since the elimination of taxicab cruising. The company put forth intensive efforts to maintain the speed and regularity of its service despite bad conditions of traffic. Its parking areas established at the suburban termini of the Market-Frankford elevated line have proved popular. In these parking areas the motorist may for a fee of 25 cents park his car and receive without added payment a 15-cent ticket entitling him to

STATEMENT OF WAGE TRENDS IN PHILADELPHIA

Calendar Year	Max. Hourly Wage, Cents	Passengers Carried per Trainman
1910.....	23	59,699
1911.....	23½	72,405
1912.....	25	77,561
1913.....	30	85,762
1914.....	30	89,790
1915.....	30	96,106
1916.....	32	107,800
1917.....	35	113,940
1918.....	48	120,102
1919.....	58	137,785
1920.....	72½	150,785
1921.....	65	137,432
1922.....	69	141,528
1923.....	70½	146,658
1924.....	71½	148,264
1925.....	77	148,632
1926.....	77	151,173
1927.....	77	145,862

try among the people served. By this means a more enlightened attitude on the part of the public toward P.R.T. and toward industry generally has been secured, resulting in a better understanding of the problems. There is no question that public indorsement of the complete co-ordination of street car, bus and taxicab has been due as much to the wide distribution of resultant dividends to car riders as to the greater service which co-ordination has made possible.

The 7 per cent cumulative preferred stock is held by 40,000 small investors, most of them car riders, many of whom have purchased the stock at the rate of \$1 per share per week payable on P.R.T. cars. On Dec. 1, 1927, all of the \$23,000,000 authorized preferred stock had been absorbed. The City Council on Dec. 17, 1927, gave its necessary assent to the issuance of \$7,000,000 additional 7 per cent preferred stock, needed to refund outstanding indebtedness and finance additional maintenance facilities and service extensions recommended in Dr. Snow's report to the Public Service Commission. The stockholders authorized this additional preferred stock issue at a special meeting held on Feb. 6, 1928.

The report goes into detail on the status of the stockholders. The stockholders from 1902 to 1911 had never received return on their stock subscription of \$30,000,000. In 1910 they saw their property threatened with receivership, through being unable to meet its fixed charges. The stock, par \$50, was selling at \$7 a share. It is now selling on the market at \$60 a share, and pays 8 per cent.

The property of P.R.T. stockholders has been completely rehabilitated. From a condition of no reserves and no surplus, adequate reserves and surplus have now been provided against known needs of the future.

Supplementing its statement on the increased riding the report states that in 1910 the average Philadelphian rode in P.R.T. cars only 288 times a year. Per capita riding had been built up by 1920 to 501. In 1920, when increased costs made added income necessary, Mitten Management sought to retain the basic 5 cent fare, urging that a flat increase would lose the profitable short-ride business and lead to still higher fares. The Public Service Commission did not agree, and ordered a flat increase to 6½ cents.

The following year, 1921, P.R.T. lost 100,000,000 short-ride passengers and has never since reached the high per capita riding of 1920. A further fare increase was from this cause made necessary in 1924.

Accompanying the statement on wage trends the report explains the market basket basis and compares the present management-men relationship with the status of the employee in the dark ages of industrial democracy.

Officers and Directors of Hocker Line Elected

At a meeting of the organization committee of the Kansas City, Merriam & Shawnee Railroad held in Kansas City, Feb. 27, officers and directors were elected.

Officers are Herman Sonken, president; W. K. Paul, Merriam, Kan., vice-president and general manager; L. G. Galamba, secretary; F. P. Dixon, treasurer; J. D. Cornell, general traffic manager; W. S. Barton, assistant traffic manager.

Members of the new board of directors are: A. M. Summermour, chairman; George McAnany, A. A. Sharum, A. M. Meyers, E. G. McDonald, F. P. Dixon, L. G. Galamba, W. K. Paul, W. F. Blanton, H. J. Miller, John Sanders, L. W. Wilson, Dick O'Brien, Herman Sonken, Herman Galamba, W. S. Barton, Fred Jackson, all of Kansas City; James E. Smith, Topeka, Kan.; W. W. Gordon, Kansas City, Kan.; A. E. Faulkner, Lincoln, Neb.; C. Neiman, Shawnee, Kan.

The electric line is the old reorganized Hocker line. A petition for a charter was filed in Topeka by Fred Jackson, general counsel.

Reorganization details have been published in these columns previously.

Book Reviews

Where Shall They Park?

National Safety Council, Chicago. 18 pages, 25 cents, with reduced prices for copies in quantity.

The subject of automobile parking is considered in this book primarily from the standpoint of accident prevention, i.e., the best way of parking where that practice is permitted, rather than the best way of stopping parking. Nevertheless, the pamphlet clearly brings out the constantly increasing demand upon street space for moving traffic, its primary right to such space, and the desirability in many cases of limiting parking and even of prohibiting it. The opinions of many merchants where this has been done are quoted to show that limitation or prohibition has not injuriously affected retail business.

The Port of New York Authority

Annual Report for the Year 1927. 70 Pages.

In the annual report of the Port of New York Authority, created by compact between the states of New York and New Jersey and ratified by Congress, it is said that progress has been made toward the solution of the problem of transporting passengers commuting between New York City and the suburbs. Part 1 covers the development of the port; part 2 interstate bridges; part 3 suburban transit and part 4 financial operations. In its conclusions on suburban transit the report states that conclusions contained in the sub-committee reports embodied in the preliminary report of the Suburban Transit Engineering Board of Jan. 11, 1928 are sound. The report also recommends concurrent legislation by New York State in support of this program.

Industry's Coming of Age

By Rexford Guy Tugwell. Harcourt, Brace & Company, New York, N. Y. 274 pages. Price, \$2.

Not long ago a keen Frenchman, André Siegfried, made a study of this land and called it "America Comes of Age." Just now a well-known economist, Rexford Guy Tugwell, surveys industry and sees it coming out of the adolescent stage. The question which both books provoke is—what is in store for America?

In "Industry's Coming of Age" a wealth of facts is marshalled to prove the astounding growth in our productivity since 1914. The author says we are in the midst of a new industrial revolution which calls for intelligence in furthering and controlling business trends for human welfare. In treating the ills of industry a popular fallacy appears in thinking that almost anything can be done or in thinking that nothing at all can be done. Neither those who

claim eternal prosperity for America or those who flee industrialism by exile in Europe contribute very much to an understanding of the changes which, if not controlled, in Dr. Tugwell's opinion will not always make for one's betterment.

In his discussion of the progress of productivity Dr. Tugwell proceeds to the general and technical causes for our virility. Among the general causes, great emphasis is placed on the spread of education, the inheritance of and addition to the racial store of technical skill and knowledge, progress toward the more complete division of labor and the consequent mechanization of industrial processes and the recent capitalizing on the possible productive contribution of women. Among the technical reasons he lists at the top the discovery and spread of scientific management and the elimination of rule-of-thumb, with standardization of many basic materials and processes.

Dr. Tugwell sees barriers to productivity in the persistence of depressions and weak spots even in good times. Herein is the reason for stock taking of American life and business now that the latter has reached its maturity. He makes a convincing and forceful plea for a better understanding of the economic forces at play so that adjustments can be made to care for the needs and desires of men.

Mr. Siegfried, who sees America at maturity, concludes with a declaration that the discussion resolves itself into a dialogue between Ford and Ghandi. Dr. Tugwell sees achievement in recognition of trends so that we can work for attainable results.

American Universities and Colleges

Edited by David Allan Robertson. (The American Council on Education). New York and London: Charles Scribner's Sons. 884 pages; price, \$2.50.

The character, scope and organization of higher education in the United States is reviewed in Part I of this volume. Part II presents condensed information regarding each of the universities and colleges on the accredited list of the American Council of Education. Supplementary information regarding thirteen classes of professional and fifteen classes of graduate schools is given in Part I. For some unexplained reason, engineering schools have far less space in proportion to their number than the other schools. Thus 130 engineering schools are given less than three pages, consisting mostly of names of schools by states, while twenty-five schools of economics are given eleven pages, with a list of professors, their degrees (by institutions), the subjects they teach, and, in some instances, other information as well. The book is valuable merely as a compilation.

Personal Items

H. J. Woodard Succeeds F. A. Brine at Atlanta

F. A. Brine has resigned as general auditor of the Georgia Power Company, Atlanta, Ga., because of ill health. His service record with the company covered 27 years.

This post has been filled by H. J. Woodard, who has been with the company for many years in which he has served in every capacity in the accounting department and in the auditing of every department. He joined the company as a clerk.

J. J. Esch Rejected as I. C. C. Member

By a vote of ten to seven the Senate Interstate Commerce Committee voted to reject the renomination of John J. Esch of Wisconsin for the Interstate Commerce Commission on March 6. His defeat comes after many years in public service work. Although as a result of the Senate's failure to act upon his renomination he automatically went out of office on Dec. 31, 1927, President Coolidge reappointed him on Jan. 3 to act during the recess of Congress over the holidays and until that body could pass upon it.

Mr. Esch was nominated on March 11, 1921, by President Harding for appointment to the Interstate Commerce Commission. He had been chairman of the House Committee on Interstate and Foreign Commerce and had manifested a special interest in railroad and transportation affairs in Congress. At that time he was appointed for a full term of seven years to succeed Robert W. Wooley, whose term expired on Dec. 31 of that year. As a member of the House of Representatives he was co-author of the transportation act and was reappointed by President Coolidge on the expiration of his first term as a commissioner.

O. J. Shaw Resigns at Lincoln

O. J. Shaw, former general manager of the Lincoln Traction Company, Lincoln, Neb., who became operating executive for the Lincoln Public Service Company when it purchased the gas and electric properties of the utilities, has resigned to devote his time to two industries of which he is the chief stockholder. Mr. Shaw has long been connected with the railway in Lincoln. The properties are now owned by the United Light & Power Company, operating through two local corporations.

Mr. Shaw joined the Lincoln Traction Company in 1911 serving in the contract department. Later he was made assistant secretary and in 1913 he

became secretary. For several years prior to his becoming general manager in 1920 he had charge of the company's overhead lines, the steam heating plant, the commercial department and the accounting department. He is a graduate of the University of Nebraska.

A. J. Fink in St. Louis as Transportation Engineer

The tireless efforts and indefatigable services of A. J. Fink have found their medium in St. Louis, Mo., where as transportation engineer of the St. Louis Public Service Company, Mr. Fink will have an unusual opportunity to capitalize on his traffic studies and experiences



A. J. Fink

gained in Pittsburgh. He was appointed on March 1 to his new position.

Mr. Fink is another "up-from-the-ranks" officer and knows the business of transportation. He has served as conductor—and so knows the employees' viewpoint—as traffic checker on the sidewalk and as time-table compiler. Eight years ago Mr. Fink went to Pittsburgh and worked with Thomas Fitzgerald, who at that time was consulting engineer for the Philadelphia Company, on the reorganization of the Pittsburgh Railways. After the multitudinous details of this work were completed, Mr. Fink was appointed assistant to the general manager in 1924. In this capacity he served until November, 1926. At that time the new form of railway supervision was instituted by the Pittsburgh Railways based upon a policy of making each executive assume entire responsibility for his own departmental activities. It solidified and systematized the entire structure of the organization. In line with this policy J. M. Loftis, superintendent of transportation, was placed in charge of three district functions of electric railway transportation, namely, traffic and schedule, car operation and trainmen's instruction, with a superintendent appointed to head each branch. A. J. Fink was appointed superintendent of the traffic and schedules reporting to

Mr. Loftis. To him was assigned the responsibility of seeing that the service was carried through.

Mr. Fink was born in Cincinnati, Ohio, and was educated in the schools there. In 1905 he entered the service of the Cincinnati Traction Company, and was employed in the operating department until 1920 when he went to Pittsburgh.

With the St. Louis Public Service Company Mr. Fink's chief task will be to carry out plans already in operation and to determine the best arrangement of traffic and schedules. One of the factors in this work is the new transfer system put into effect Jan. 1 by which the company is able to study the direction of its patrons and ascertain which locations are the most popular.

E. H. Maggard Succeeds W. S. Palmer at San Francisco

With the retirement early in April of W. S. Palmer as president and general manager of the Northwestern Pacific Railroad, San Francisco, Cal., attention is again directed to E. H. Maggard, elected by the board of directors to succeed in that post. Mr. Maggard's experience in railroading covers a period of more than 35 years. During that time he has held responsible posts in the south and in California but is known especially for his services with the Petaluma & Santa Rosa Railroad of which property he has been general manager since 1916 and president since 1925. In 1926 he was elected president of the California Electric Railway Association.

Prior to his association with the California property, and at an early age, Mr. Maggard entered the service of the Missouri, Kansas & Texas Railway at Denison, Tex., as call boy. In 1893 he resigned to accept a position with the Southern Pacific at Houston as clerk in the freight office. In this capacity he remained until 1900 and then he entered the service of the El Paso & North-eastern Railway at El Paso, Tex., as chief clerk in the freight office. Soon he was promoted to agent of the company and from agent to superintendent of terminals. It was from this property in 1907 that he resigned to go as general freight and passenger agent with the Petaluma & Santa Rosa Railroad.

Mr. Maggard was born at Meridian, Miss., in 1875. He moved to Texas with his parents in 1877 and was educated in the public schools at Corsicana and Denison. His appointment to the presidency of the Northwestern Pacific Railroad which operates 41 miles of electric lines and is controlled by the Southern Pacific Company is expected to aid the Southern Pacific and Santa Fé in their application now pending before the Interstate Commerce Commission to acquire the Petaluma & Santa Rosa Railroad.

W. S. Palmer, the retiring president was made general manager of the Northwestern Pacific Railroad in 1907. Seven years later he became president and general manager. He entered railroad

service in 1876, following his graduation as a civil engineer from the University of California. He worked many years with the Central & Southern Pacific as an engineer of construction and in 1901 became superintendent of the Sacramento division. Following the joint acquisition of the Northwestern Pacific Railroad by the Southern Pacific and Santa Fé Mr. Palmer went with that property.

Promotions at Rome Division

Three changes in personnel of the Georgia Power Company, Atlanta, Ga., affect operation at the Rome Division. These promotions were announced by W. E. Mitchell, vice-president and general manager.

T. S. Sloan, who recently resigned his position with the Central Georgia Power Company, became division manager, effective March 1.

J. H. McCombs, former distribution engineer in Atlanta, has been promoted to division superintendent of operations, effective March 1.

J. M. Flanigen, appointed division superintendent in December, is scheduled for Atlanta.

William Siebert of Brooklyn Honored

William Siebert, superintendent of transportation of the surface lines of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., has rounded out 40 years of service on the Brooklyn railway lines, twenty of which have been spent in his present position of superintendent of transportation of the surface lines. In recognition of that event more than 130 of his associates and friends gathered recently at Prospect Hall, Brooklyn, to congratulate him on his many years of well-performed service. The affair was in the nature of a surprise.

Most of those at the dinner were men who have worked with Mr. Siebert in the Brooklyn companies for many years and cherish their friendship and association with him, and as a small token of their affection and esteem, they presented to him a sterling silver beverage set and tray.

County Clerk William E. Kelly was the toastmaster of the evening and the speakers were Supreme Court Justices Stephen Callaghan and Edward J. Byrne, President W. S. Menden and Vice-President Travis H. Whitney of the B.-M. T. System; Vice-President Clinton E. Morgan of the Brooklyn City Railroad and Mr. Siebert himself.

Mr. Siebert began his railroad career in 1887 as a conductor on the Nostrand Avenue horse car line. His advance through the ranks was steady until he finally was in charge of the Ridgewood Depot. Mr. Siebert told the story of his appointment to the post of superintendent of transportation of the surface lines in 1907. He said:

One day about twenty years ago Mr. Menden sent for me to come downtown and see him. When I got into his office he told me he wanted me to take the job of superintendent. I told him I did not want the job as nobody seemed to last long in that job and I had a family to take care of. He said he thought I would be able to handle myself satisfactorily in the job and finally told me to take a week to think things over and then come back to see him. I went back a week later and told him again that I didn't want the job. But I didn't know he had been talking with Harry Crowe and some of the others who knew me downtown and they had told him just to tell me to try my hand at the job and I would stick at it. At any rate, when I told him I still didn't want the job, he simply said he'd have to have someone downtown and asked me to go inside and help him out temporarily. That was twenty years ago and I'm still helping out.

He summed up the basis of his success when he declared:

I want to thank every man in the surface transportation department for the splendid loyalty and support they have given me at all times. One man cannot run a railroad. We sometimes say we are running it but that isn't true. We must have the co-operation and support of every man in the organization from switchboy to president and unless we have that our efforts to run the railroad to satisfy the public and the management are bound to fail. I have been fortunate in having enjoyed that loyalty and support in a generous degree and I owe all of whatever success I have achieved to each and every one of you.

Changes on Ohio Property

L. N. Bennett, Port Clinton, has been promoted to the superintendency of the Ohio Public Service Company with headquarters in Oak Harbor. He succeeds R. S. Huber, Oak Harbor, who fills another post with the company.

Obituary

George McQuaid

George McQuaid, director of public relations for the Central and South West Utilities Company, an Insull interest, died on March 5 at his home in Dallas. In 1922 he was employed by the public utility organizations of Texas and was placed in charge of the Texas Public Service Information Bureau in Dallas. The bureau issued a weekly news bulletin giving current news and information regarding public utilities operating in Texas. He had been connected with various newspapers in Texas for 30 years serving in different capacities from reporter to managing editor and editor.

The late Mr. McQuaid was born in Virginia in 1875 and was educated at Georgetown University, Washington, D. C., receiving both the A.B. and B.L. degrees. After his graduation he entered newspaper work in Oklahoma and

shortly thereafter became managing editor of the Guthrie *State Capital*. Later he joined the staff of the San Antonio *Express* and was managing editor of this paper from 1905 to 1910. His next move was to Galveston as editor of the *Galveston Daily News*. There he remained for three years being forced to give up this position on account of failing health.

After recuperating in El Paso for more than a year Mr. McQuaid went to Oklahoma City as correspondent for the *Dallas Morning News* in charge of the news service in Oklahoma. While in Oklahoma he made a record for building up a news-gathering organization. Two years later he returned to Dallas and was put in charge of the oil development news of the *Dallas Morning News*, serving in the field as oil editor and staff correspondent. He left newspaper work then for about a year but returned as managing editor of the *Dallas Morning News*. This position he held until December, 1921. At that time he purchased the Mexia, Tex., *Evening News* and edited and published that paper until he sold his interests and accepted a position with the Texas utility organizations.

Nels Jensen

Nels Jensen, master mechanic of the Wisconsin Valley Electric Company, Wausau, Wis., and well known in utility circles died Feb. 17. He had been working on Feb. 16. Mr. Jensen entered the employ of the Wisconsin Valley Electric Company in the summer of 1907 and for the past eighteen years had served as master mechanic. He was born in Denmark April 13, 1863. He had been in this country approximately 40 years. Mr. Jensen was known among his associates both in and out of the company as the "Grand Old Man."

ROY ROACH, superintendent of the Eighteenth and Olive division of the Kansas City Public Service Company, Kansas City, Mo., died recently. Mr. Roach had been in the employ of the company since January, 1906, serving as trainmen and superintendent at the various divisions. He was born at Everett, Kan., in 1883 and received his early education there and at Enid, Okla. In 1901 he took his first position as a messenger boy for the Chicago, Rock Island & Pacific Railway.

CLYDE V. FUNK, for 28 years a traveling representative of the Ohmer Fare Register Company, died at Boston, Mass., Feb. 3. Mr. Funk had a wide acquaintance among electric railway and bus officials throughout the country, especially in New England and along the Atlantic seaboard. He was born in Dayton, Ohio, 57 years ago and entered the employ of the Ohmer Fare Register Company during the early years of its existence.

Manufactures and the Markets

Nashville Railway Improvements

Nashville Railway & Light Company, announces that it will expend about \$750,000 in extending and broadening its service in 1928.

More than \$100,000 has been set aside for improvements in street railway facilities, safety devices getting a substantial part of the budget. New street paving on the company's street railway lines takes up a large part of the budget, and an automatic railway substation will be installed to give increased power to the Finn Street section of the city.

Public Service and Brooklyn City Order Fare Boxes

Public Service Co-ordinated Transport, Newark, N. J., has ordered 200 Type J electric fare box equipments for its new buses from the Johnson Fare Box Company, Chicago, Ill. The Brooklyn City Railroad of Brooklyn, N. Y., has also ordered 144 Type J electric fare boxes for its regular trolley cars.

Public Service Redecorates Cars

The Public Service Railway, Newark, N. J., has just completed refitting and redecorating the cars operating on the Perth Amboy line. The interiors have been repainted in a cream color and the seats have been reupholstered in leather.

C. E. Beardsley President of Bridgeport Brass

Bridgeport Brass Company has elected Charles E. Beardsley, president of Beardsley & Wolcott Manufacturing Company, as president and director,

succeeding Carl F. Dietz. George T. Wigmore, Ralph E. Day, Paul D. Hamilton and Rowley Phillips replaced directors who had resigned. George T. Wigmore was elected treasurer and also succeeded R. I. Reithercut as secretary. Walter Blatz, general manager, retired.

Virginia Electric & Power Company Improves System

Virginia Electric & Power Company, Richmond, Va., has planned expenditures of \$4,000,000 for improvements to its properties. \$1,000,000 will be spent on rebuilding tracks and paving, shop equipment and improvements to street cars and buses.

Westinghouse Air Brake Report

In the report of the board of directors of the Westinghouse Air Brake Company and subsidiaries, Wilmerding, Pa., for the year 1927 the net earnings for the year, after deducting all expenses, including adequate provision for depreciation of plants and equipment and reserve for federal and other taxes, were \$8,520,009.53, as shown by the consolidated surplus account. Of this amount \$5,946,223.25 (70 per cent) was distributed to the stockholders in dividends and the balance of \$2,573,786.28 (30 per cent) was added to the surplus account. This compares with net earnings of \$10,535,062.09 in the previous year, dividends of \$6,342,099.00 (60 per cent) and addition to surplus account of \$4,192,963.09 (40 per cent).

The new car and locomotive orders placed by the railroads in 1927 were less than in any year since 1921, resulting in a reduced volume of business in air

brake equipment and locomotive stokers; however, the sales of signal apparatus and train control equipment of the Union Switch & Signal Company, exceeded the figures for 1926, the best previous year in the company's history.

Tests Made to Demonstrate Air-Magnetic Brake

A series of tests to demonstrate the operation and effectiveness of its air-magnetic brake was made by the Cincinnati Car Company on Feb. 21. The demonstration was made on the tracks of the Cincinnati, Hamilton and Dayton Railway, between Hamilton and Trenton, Ohio, under the supervision of the A. C. Nielsen Company of Chicago. A group of approximately 50 operators and manufacturers representatives also witnessed the tests.

The car used was the Cincinnati light de luxe interurban car exhibited at the 1927 Cleveland Convention. A three mile section of track was measured off, the first two miles marked at each mile point and the third mile marked every 50 feet.

The car was started back of the two mile mark, getting up speed, running two full miles and then had the various brake applications made at the beginning of the third mile. The distance required to stop was measured and the time to stop taken. The speed of the car when the brakes were applied was determined by a stop watch and a tachometer.

Two tests were made using the magnetic brake only, two using the air brake only and two using the air and magnetic brakes combined. Then one test of the magnetic brakes, one of the air brakes and one of the air-magnetic brakes were made on a greased track.

The average rate of retardation in miles per hour per second of the two tests made with the magnetic brake only, on dry track, was 1.33 and the average retardation of the air brakes only, was 2.98 while the average retardation of



The Cincinnati light de luxe interurban car used in making the air-magnetic brake tests

TEST DATA FROM NINE RUNS SHOWING RESULTS WITH
(1) MAGNETIC BRAKES ALONE, (2) WITH AIR BRAKES ALONE AND
(3) WITH AIR-MAGNETIC BRAKES

Brake Used	Air (Lb.)	Line Volts	Speed at Brake		Distance to Stop (Ft.)	Time to Stop (Sec.)	Retardation Miles/second
			Tach.	Stop- Watch			
(1) mag.....	..	573	51.5	51.4	1,623	41.3	1.24
(1) mag.....	..	574	52.0	51.4	1,580	36.0	1.43
(2) air.....	70	..	49.0	48.7	666	16.0	3.04
(2) air.....	70	575	51.0	50.7	752	17.4	2.91
(3) air-mag...	70	575	52.0	52.0	599	13.2	3.94
(3) air-mag...	70	583	51.5	52.2	596	13.0	4.01
*(1) mag.....	69	546	49.5	48.0	1,398	33.2	1.45
*(2) air.....	69	554	49.5	48.0	983	22.5	2.13
*(3) air-mag...	70	575	49.0	50.7	725	15.8	3.21

* Track greased for 800 ft. on last three tests.

COMPARISONS BETWEEN AIR-MAGNETIC vs. AIR BRAKES ALONE
AVERAGES FOR TWO RUNS USED IN EACH CASE
FOR DRY TRACK)

Brake Used	Speed Stop- Watch	Dis- tance to Stop	Time to Stop	Re- tar- da- tion	Decrease—Air-Magnetic Over Air		In- crease in Re- tar- da- tion	
					Dis- tance Per Cent	Time Per Cent	Dis- tance Per Cent	Time Per Cent
(1) mag.	51.4	1,602	38.7	1.33				
(2) air..	49.7	709	16.7	2.98				
(3) air- mag.	52.1	598	13.1	3.98	111	15.7	3.6	21.6
*(1) mag.	48.0	1,398	33.2	1.45				
*(2) air..	48.0	983	22.8	2.13				
*(3) air- mag.	50.7	725	15.8	3.21	258	26.2	6.7	29.8

* Track greased.

the air-magnetic combination was 3.98.

The decrease in stopping distance of the air-magnetic brake over the air brake only was 111 ft. or 15.7 per cent. The stopping time decrease was 3.6 seconds or 21.6 per cent while the increase in retardation was 33.5 per cent.

On the greased track the increase of retardation was even more pronounced. The retardation of the air brakes only was 2.13 m.p.h.p.s. while with the air-magnetic brakes it was 3.21 m.p.h.p.s., or an increase of 50.7 per cent.

The decrease in the distance to stop by the air-magnetic brakes over the air brakes on a greased track was 258 ft. or 26.2 per cent while the stopping time was decreased 6.7 seconds or 29.8 per cent.

Freight Service Expanded by Interstate Company

Much progress was made by the Interstate Public Service Company, Indianapolis, Ind., during the past year in broadening the scope of territory served with freight service. Through rates and working arrangements were made in connection with the Monon Railroad, the connection being at Indianapolis. This broadened the scope of the territory of the Interstate Public Service Company with through rates and working arrangements of approximately 200 additional towns. The tariff covering this work, to be exact, was effective on Sept. 29, 1927, and for the three months following in 1927 the volume of business handled showed an increase every month. Patrons of the Interstate are very much in accord with this service, as in a great many cases the company is rendering much quicker service in connection with the property and the Monon than they had prior to this arrangement. In addition to this, arrangements were made so that the Interstate Public Service Company is shown as originating, delivering and participating carriers in B. T. Jones' Tariff No. 450, naming class rates between C. F. A. and S. F. A. territory. These rates are to become effective on Jan. 15, 1928, and when once effective give the electric railway through rates and working arrangements with standard steam carriers between points on our property and all points south of the Ohio River and east of the Mississippi.

This is a step in broadening the territory of the electric railway. The feeling is that it will increase the company's business materially, and at the

same time assist it in serving patrons a great deal better in the future than has been possible in the past.

Yellow Truck & Coach Moves to Pontiac

The Yellow Truck & Coach Manufacturing Company will begin the complete removal of its general offices and factory from Chicago to the new \$8,000,000 plant at Pontiac, Mich., about March 24. The present quarters of the Yellow Truck Company on Dickens Avenue, Chicago, have been leased for occupancy on April 1.

ROLLING STOCK

MONTREAL TRAMWAYS COMPANY, Montreal, Canada, is having an articulated car built for experimental purposes by Canadian Car & Foundry Company. The car will be 81 ft. long with a seating capacity of 90. The leading and trailing trucks will each be equipped with two 42-hp. Westinghouse type 510-A2 motors. It is intended to use the car during rush hours only, and on routes upon which the grades are 6 per cent or less. Delivery is expected in this month.

TRACK AND LINE

PORTLAND ELECTRIC POWER COMPANY, Portland, Ore., will start repairs at once on the electric carlines in the Kings Heights and Arlington Heights

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	March 6, 1928
Metals—New York	
Copper, electrolytic, cents per lb.....	13.8375
Copper wire, cents per lb.....	16.125
Lead, cents per lb.....	5.975
Zinc, cents per lb.....	5.85
Tin, Straits, cents per lb.....	51.50
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.....	.....
Somersett mine run, Boston, net tons.....	.....
Pittsburgh mine run, Pittsburgh, net tons.....	.....
Franklin, Ill., screenings, Chicago, net tons.....	1.825
Central, Ill., screenings, Chicago, net tons.....	1.675
Kansas screenings, Kansas City, net tons.....	2.125
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.....	5.30
Weatherproof wire base, N. Y., cents per lb.....	16.50
Cement, Chicago net prices, without bags.....	2.05
Linseed oil (5-bbl. lots), N. Y., cents per lb.....	10.2
White lead in oil (100-lb. keg), N. Y., cents per lb.....	13.25
Turpentine (bbl. lots), N. Y., per gal.....	\$0.64

district, the city of Portland agreeing to pay the street car company \$3,000 since the tracks and lines are owned by the city. The street car company will then lease from the city these tracks and overhead equipment, with the understanding that the service shall be every 30 minutes for eighteen hours a day.

SHOPS AND BUILDINGS

J. GRAHAM BROWN, Louisville, Ky., will construct a bus terminal in that city costing \$100,000. The terminal will serve ten bus companies operating in and out of Louisville, including one direct line to Chicago and another to St. Louis.

CHICAGO, SOUTH SHORE & SOUTH BEND RAILROAD, Michigan City, Ind., has opened its new freight receiving and shipping station in South Bend, Ind. The new station will be a terminal for the company's recently established truck-trailer system of merchandise dispatched in the South Bend district.

TRADE NOTES

WATERBURY CABLE SERVICE, INC., Chicago and New York, has a contract covering installation of subway cables on the line of Brooklyn-Manhattan Transit Corporation, Brooklyn, New York. Work of this kind is a specialty of Waterbury Cable Service, Inc., which contracts for installation of underground cables and the handling of all matters from the time cable is received from the cable manufacturers until it is put into actual use. It also contracts for furnishing and installing street lighting systems complete outside of the central station; the installation of conduits, and the marketing of a number of devices for use in connection with cable networks and distributing systems. Waterbury Cable Service, Inc., is the company of which William O. Wood, formerly president New York & Queens County Railway, has recently been elected vice-president, with headquarters in New York.

TAYLOR ELECTRIC TRUCK COMPANY, Troy, N. Y., has increased the board of directors from three to five. G. A. Tupper, M. B. Taylor, W. E. Taylor, H. M. Dibert and E. H. Betts constitute the board. G. A. Tupper is president, M. B. Taylor, vice-president, and W. E. Taylor, secretary and treasurer.



Beaver Valley Traction Company
repeats on
"Peacock" Staffless Brakes!

Reg. U. S. Pat. Off.



For the second time in a year the Beaver Valley Traction Company, New Brighton, Pa., has placed new cars in service equipped with "Peacock" Staffless Brakes.

At the end of the year eight one-man, two-man, double truck cars, built by the Osgood-Bradley Car Co., were placed in service. They have an over all length of 44 ft. 4 in., are of semi-steel construction and the entrance and exit doors are on the right side only.

A repeat order is the usual story once "Peacock" Staffless Brakes are tried out.

May we tell you why?

National Brake Company, Inc.

890 Ellicott Square

Buffalo, N. Y.

Canadian Representative

Lyman Tube & Supply Co., Ltd., Montreal, Can.



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Peacock
Staffless

Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
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The J. G. White Engineering Corporation

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since 1898 and of Chain Grate
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HALSEY McGOVERN

Mills Bldg., 17th and Pa. Ave., Washington, D. C.

When writing the advertiser for information or
prices, a mention of the Electric Railway
Journal would be appreciated.



NACHOD & UNITED STATES SIGNAL CO., INC.

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ELECTRIC RAILWAYS

HIGHWAY CROSSING SIGNALS



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RAIL JOINTS
DYNAMOTORS
WELDING ROD
UNA Welding & Bonding Co.
Cleveland, Ohio.



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Seamless—Rivetless—Light Weight
Best for Service — Durability and
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ENCLOSED ELEMENTS

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BEARINGS**

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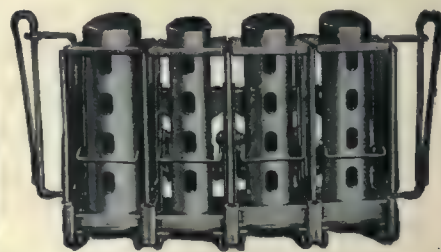
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Send for bulletin No. 52

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Chilled Back of Flanges
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Box Numbers, in care of any of our offices count 10 words additional in undisplayed ads.
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SUPERINTENDENT of equipment, M. M. of long experience, desires to make change. PW-89, Electric Railway Journal, Tenth Ave. at 36th St., New York.

POSITIONS WANTED

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Will pay cash for three double end, Single Truck, equipped with Westinghouse 508 motors. Must be in good condition and price must be low.

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RENT, LEASE, OR EXCHANGE EQUIPMENT
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We buy entire
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Power Plants

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We sell
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WHY let Mother Nature grow grass between the wheels of replaced cars? Why pile up rails, shop equipment, power plant equipment, line equipment, car appliances, road building material, etc., etc., you will never use again?

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6000 other electric railway men will see your advertisements of used or surplus equipment and materials here—in the Searchlight Section of their business paper.

Some of these men—officials or executives of other lines in other parts of the country and operating under different conditions—can use what you no longer need. For

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One "Searchlight" advertiser wrote, "We can cheerfully recommend the Searchlight Section as a wonderful medium for reaching buyers of rails and equipment." Another—"The strongest proof that your 'Searchlight' finds its way to many readers is shown by the numerous letters we have received in answer to our recent ad."

Let us tell you the cost of advertising your used or surplus equipment and materials in the Searchlight Section. Just address a list of what you have to dispose of to the

Searchlight Department
ELECTRIC RAILWAY JOURNAL
Tenth Ave. at 36th St., New York, N. Y.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

- Advertising, Street Car**
Collier, Inc., Barron G.
- Air Brakes**
General Electric Co.
Westinghouse Traction Brake Co.
- Anchors, Guy**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Armature Shop Tools**
Columbia Machine Works
Elec. Service Supplies Co.
- Automatic Return Switches**
Stands
Ramapo Ajax Corp.
- Automatic Safety Switches**
Stands
Ramapo Ajax Corp.
- Axles**
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Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Westinghouse E. & M. Co.
- Babbitting Devices**
Columbia Machine Works
- Babbit Metal**
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- Badges and Buttons**
Elec. Service Supplies Co.
- Batteries, Dry**
Nichols-Lintern Co.
- Bearings, Anti-Friction**
Timken Roller Bearing Co.
- Bearings and Bearing Metals**
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Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
National Bearing Metal Corp.
Westinghouse E. & M. Co.
- Bearings, Center and Roller Side**
Cincinnati Car Co.
Columbia Machine Works
Stueck Co., A.
- Bearings, Roller**
Timken Roller Bearing Co.
- Bearings, Thrust**
Timken Roller Bearing Co.
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Consolidated Car Heating Co.
- Bells and Gongs**
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Elec. Service Supplies Co.
- Benders, Rail**
Railway Trackwork Co.
- Body Material, Haskellite Plymet**
Haskellite Mfg. Corp.
- Bodies, Bus**
Brill Co., The J. G.
- Boiler Tubes**
National Tube Co.
- Rollers**
Babcock & Wilcox Co.
- Bond Testers**
American Steel & Wire Co.
Electric Service Supplies Co.
- Bonding Apparatus**
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Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
- Bonds, Rail**
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Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.
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(See also Poles, Ties, Posts, etc.)
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Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
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Brill Co., The J. G.
- Cincinnati Car Co.**
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Westinghouse Tr. Br. Co.
- Brake Shoes**
American Brake Shoe & Foundry Co.
Bemis Car Truck Co.
Brill Co., The J. G.
- Brake Testers**
National Ry. Appliance Co.
- Brakes, Brake Systems and Brake Parts**
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Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
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Westinghouse E. & M. Co.
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General Electric Co.
- Bulkheads**
Haskellite Mfg. Corp.
- Bunkers, Coal**
American Bridge Co.
- Buses**
General Electric Co.
- Bus Lighting**
National Ry. Appliance Co.
- Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
- Cables (See Wires and Cables)**
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General Electric Co.
Irvington Varnish & Ins. Co.
- Carbon Brushes (See Brushes, Carbon)**
- Car Lighting Fixtures**
Elec. Service Supplies Co.
- Car Panel Safety Switches**
Consolidated Car Heating Co.
Westinghouse E. & M. Co.
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Cincinnati Car Co.
- Car Wheels, Rolled Steel**
Bethlehem Steel Co.
- Cars, Dump**
Brill Co., The J. G.
Differential Steel Car Co.
- Cars, Gas-Electric**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.
- Cars, Gas, Rail**
Brill Co., The J. G.
- Cars, Passenger, Freight, Express, etc.**
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Brill Co., The J. G.
Cincinnati Car Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.
- Cars, Second Hand**
Electric Equipment Co.
- Cars, Self-Propelled**
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- Castings, Brass Composition or Copper**
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Columbia Machine Works
National Bearing Metals Corp.
- Castings, Gray Iron and Steel**
American Brake Shoe & Foundry Co.
American Bridge Co.
Bemis Car Truck Co.
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Standard Steel Works
- Castings, Malleable & Brass**
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Timken Roller Bearing Co.
- Catchers and Retrievers, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
- Catenary Construction**
Archbold-Brady Co.
- Ceiling Car**
Haskellite Mfg. Corp.
- Ceilings Plywood Panels**
Haskellite Mfg. Corp.
- Change Carriers**
Cleveland Fare Box Co.
Electric Service Supplies Co.
- Change Trays**
Cincinnati Car Co.
- Circuit-Breakers**
General Electric Co.
Westinghouse E. & M. Co.
- Clamps and Connectors for Wires and Cables**
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Cleaners and Scrapers Track**
(See also Snow-Flows, Sweepers and Brooms)
Brill Co., The J. G.
Cincinnati Car Co.
Long Mfg. Co.
- Coil Banding and Winding Machines**
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
- Coils, Armature and Field**
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.
- Coils, Choke and Kieking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Coin Changers**
Johnson Fare Box Co.
- Coin Counting Machines**
Cleveland Fare Box Co.
Johnson Fare Box Co.
- Coin Sorting Machines**
Cleveland Fare Box Co.
Johnson Fare Box Co.
- Coin Wrappers**
Cleveland Fare Box Co.
- Commutator Slotters**
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
Wood Co., Chas. N.
- Commutators or Parts**
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.
- Compressors, Air**
General Electric Co.
Westinghouse Tr. Br. Co.
- Condensers**
General Electric Co.
Westinghouse E. & M. Co.
- Condenser Papers**
Irvington Varnish & Ins. Co.
- Connectors, Solderless**
Westinghouse E. & M. Co.
- Connectors, Trailer Car**
Columbia Machine Works
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.
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Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.
- Controller Regulators**
Elec. Service Supplies Co.
- Controlling Systems**
General Electric Co.
Westinghouse E. & M. Co.
- Converters, Rotary**
General Electric Co.
Westinghouse E. & M. Co.
- Copper Wire**
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Mining Co.
- Copper Wire Instruments, Measuring, Testing and Recording**
American Brass Co.
Anaconda Copper Mining Co.
- Cord, Bell, Trolley, Register**
American Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
Roebbling's Sons Co., John A.
Samson Cordage Works
- Cord Connectors and Complers**
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
- Couplers, Car**
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Traction Brake Co.
- Cowl Ventilators**
Nichols-Lintern Co.
- Cranes, Hoists and Lifts**
Electric Service Supplies Co.
- Cross Arms (See Brackets)**
- Crossing Foundations**
International Steel Tie Co.
- Crossings**
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.
- Crossings, Frogs & Switches**
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.
- Crossings, Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.
- Crossings, Track (See Track Special Work)**
- Crossings, Trolley**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Curtains and Curtain Fixtures**
Brill Co., The J. G.
Edwards Co., O. M.
- Cutting Apparatus**
General Electric Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse Electrical & Mfg. Co.
- Dealer's Machinery & Second Hand Equipment**
Salzberg Co., Inc., H. E.
- Derailing Devices (See also Track Work)**
- Derailing Switches**
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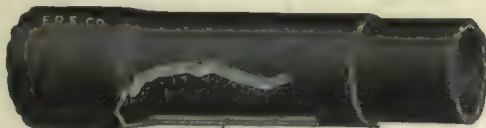
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Rod, Wire and Cable Products

ANACONDA COPPER MINING COMPANY
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ANACONDA TROLLEY WIRE

"Bates Poles Outlive the Bond Issues that Buy Them"

BATES POLES AND STRUCTURES

Bates Expanded Steel Truss Co.

General Offices and Plants
EAST CHICAGO, INDIANA, U. S. A.

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Towers and Transmission Structure American Bridge Co. Bates Expanded Steel Truss Co. Westinghouse E. & M. Co.	Trolley Bases, Retrieving E. D. Nuttall Co. Ohio Brass Co.	Truss Planks Haskelite Mfg. Corp.	Welders, Portable Electric General Electric Co. Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.	Wheels, Trolley Columbia Machine Works Elec. Ry. Equipment Co. Elec. Service Supplies Co. National Bearing Metals Corp. R. D. Nuttall Co. Ohio Brass Co. Star Brass Works
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Track, Special Work Columbia Machine Works Ramapo Ajax Corp.	Trolley Material, Overhead Elec. Service Supplies Co. General Electric Co. National Bearing Metals Corp. Ohio Brass Co. Westinghouse E. & M. Co.	Tubing, Steel National Tube Co. Timken Roller Bearing Co.	Welding Processes and Apparatus Metal & Thermit Corp. Ohio Brass Co. Railway Trackwork Co. Una Welding & Bonding Co. Westinghouse E. & M. Co.	Window Guards & Fittings Cincinnati Car Co.
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		Ventilators, Car Brill Co., The J. G. Cincinnati Car Co. Consolidated Car Heating Co.		
		Vestibule Linings Haskelite Mfg. Corp.		



Consider the Brill 277-EX Truck And How It Performs

The primary object in the design of the Brill 277-EX Truck is to reduce unsprung weight and thus decrease the noise of operation without sacrificing strength and superlatively good riding qualities.

Embodied in its construction are solid-forged side frames, recognized for their superior rigidity and squareness; the Graduated Spring System, Half-ball Bolster Guide and Twin Links, distinctive Brill patented features, contribute much to the smooth and comfortable riding qualities of this truck.

The motors are spring supported and entirely independent of the axles. External contracting shoe-type drum brakes are positive in action and aid in reducing noise. In general efficiency, the Brill 277-EX Trucks under "The Car for 1928" are a decided advance and merit the earnest consideration of the electric railway industry.



"The Car for 1928"



THE J. G. BRILL COMPANY
PHILADELPHIA, PA.



AMERICAN CAR CO.
ST. LOUIS, MO.

G. C. KUHLMAN CAR CO.
CLEVELAND, OHIO.

WASON MANFC CO.
SPRINGFIELD, MASS.

Waukesha-Engined Fageol Trackless Refrigerator Train



a-766-LC

Hauling Gobs' Grub

Fifty Waukesha-engined Fageol trucks are operated by the Golden Gate Motor Transport Co. of San Francisco. These six-cylinder, six-wheel, ten-ton trucks with ten-ton trailers are used to transport perishable foods. Although they are provided with an automatic refrigerating system they must make rapid runs and real power is required to assure "on time" arrival of each load.

Six-cylinder 100 H.P. Waukesha "Ricardo Head" engines are used in these refrigerator Fageol trucks. A. O. Stewart, President of the Golden Gate organization says: "We have been honored with the government contract for all hauling for the Mare Island Navy Yard and the Fageols are serving us splendidly in this work." If you require a heavy duty engine for truck or bus service, you will find a Waukesha available. Seven sizes from 50 to 125 H. P.

(A-805-LC)

AUTOMOTIVE EQUIPMENT DIVISION

WAUKESHA MOTOR COMPANY
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Eastern Sales Offices Eight W. 40th Street New York City

Exclusive Builders of Heavy Duty Automotive Type Engines for Over Twenty Years

ELECTRIC RAILWAY JOURNAL

Hill Publishing Company, Inc.

MARCH 17, 1928




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LOOK UP! THERE'S POWER OVERHEAD FOR TRACK CONSTRUCTION OPERATIONS!

Modern production methods demand power—fortunately it's right overhead for paved track construction, and it's free!

Cut out the wasteful labor  gangs. Machines will do all the work, better, cheaper, faster.



For the big program take an electric crane  a differential car  a concrete mixer  a tie layer



and a compression tamper.



Add to these

modern machines, Steel Twin Ties  and you're ready to build modern track on a modern production basis. For the smaller program this construction plan can be modified to suit the amount of track to be laid. But no matter how large or small the job, modern production methods and Steel Twin Ties  will do a better, more lasting job—and less money will be expended.

Write today for 1928 delivered prices for your track program, giving footage to be constructed.

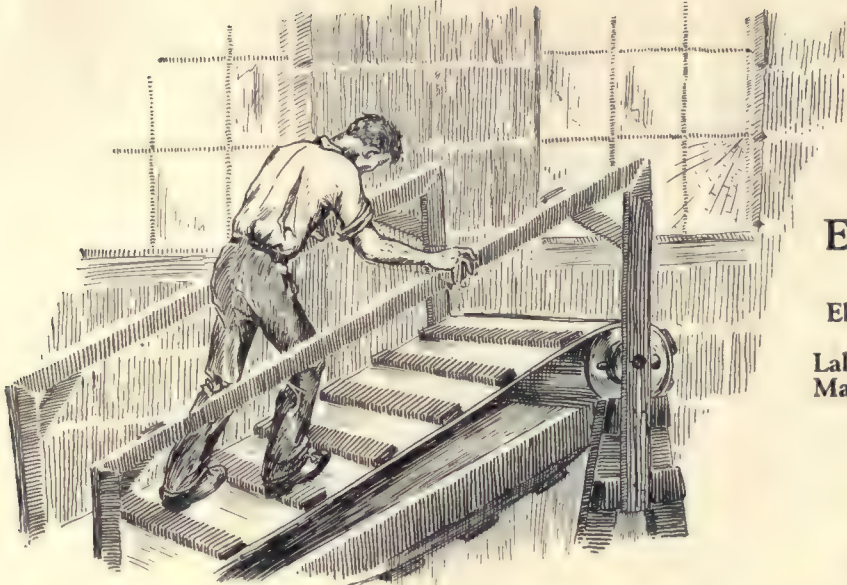
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CLEVELAND, OHIO

STEEL TWIN TIE TRACK

THE BASE OF MODERNIZATION

MAINTENANCE LABOR EXPENSE

*can be lowered by the exclusive
use of the Highest Grade Renewal Parts*



*Is your labor uphill
and getting nowhere?*

From the
Electric Railway Journal

Electric Railway Maintenance Expense
Cars 1927

Labor	\$44,952,000—55%
Material	\$36,941,000—45%
Total	100%

Frequent replacement
of parts creates an
endless chain of labor

Results: 1. Added labor expense.
2. Increased wear of adjacent
parts.

Buy only the best
renewal parts

Results: 1. Increased mileage between
replacements.
2. Reduced labor expense.
3. Lower maintenance expense.



Westinghouse

Renewal Parts

Reduce Maintenance

Costs

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Vol. 71
No. 11

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The Manufacturer Plays an Important Part

RAILWAY men sometimes overlook the part played by the manufacturer in the solution of operating problems. This is an important part for several reasons; not only is the manufacturer's engineer a specialist on both the design and maintenance of his particular products, but his viewpoint is broadened by contact with the operating experience of many properties over a wide range of conditions. Unless this experience is made available to operating men the industry loses a valuable asset of specialized talent.

The day has gone by when the thinking maintenance executive is satisfied with his own practices and experience. He has come to realize the value of helpful criticism and suggestions from the men who supply his equipment. As evidence of this it is noteworthy that manufacturers' representatives occupy a prominent place on association programs—particularly in sectional meetings where there is opportunity for adequate discussion.

In keeping with the importance of his functions in the industry the manufacturer takes a prominent place in this annual maintenance number of ELECTRIC RAILWAY JOURNAL. The articles cover a wide range of maintenance and construction problems. They criticize frankly some operating practices and contain many helpful suggestions. At the same time they are friendly and constructive. The manufacturer is vitally interested in the progress of the industry; for he prospers only as the industry itself prospers.

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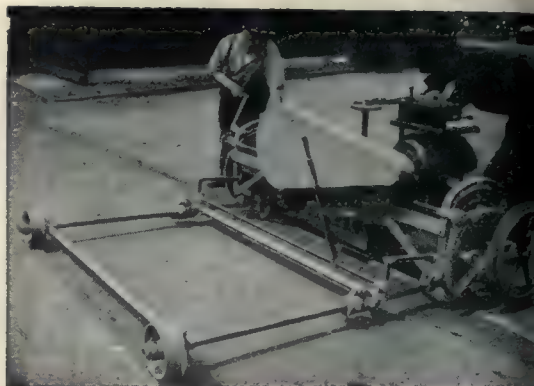
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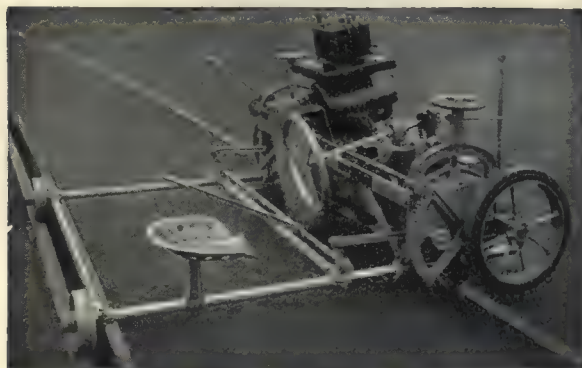
DEMANDS BETTER TRACK



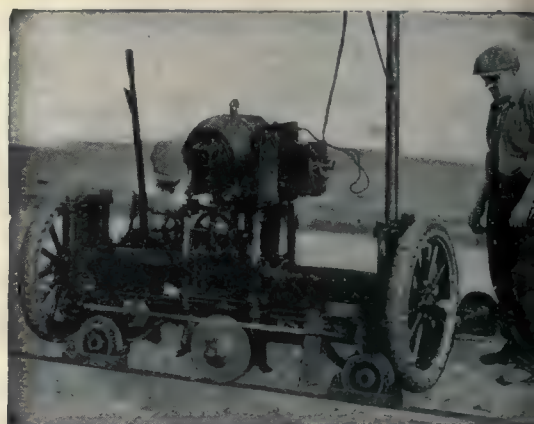
Eureka Radial Rail Grinder



"Vulcan" Rail Grinder



"Improved Atlas" Rail Grinder



"Imperial" Track Grinder



"Hercules" Swing Frame Rail Grinder



Reciprocating Track Grinder

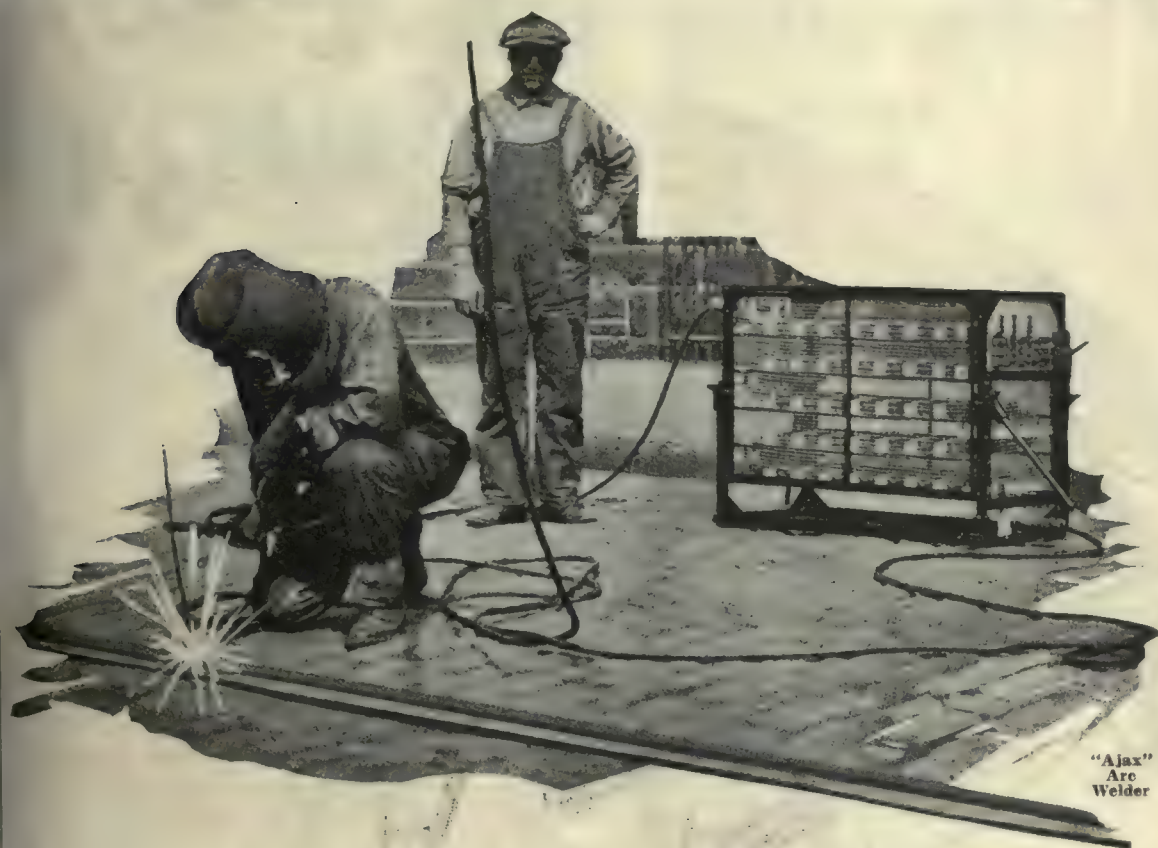


Eureka with Outtrigger for open track.



"Midget" Rail Grinder

BETTER TRANSPORTATION



"Ajax"
Arc
Welder

Preventive Maintenance Beats Repairs

It's cheaper to keep the rail smooth than to replace the track.

It's cheaper to keep the rail smooth than to repair the damage to rolling stock caused by rough track.

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Railway Trackwork Co.

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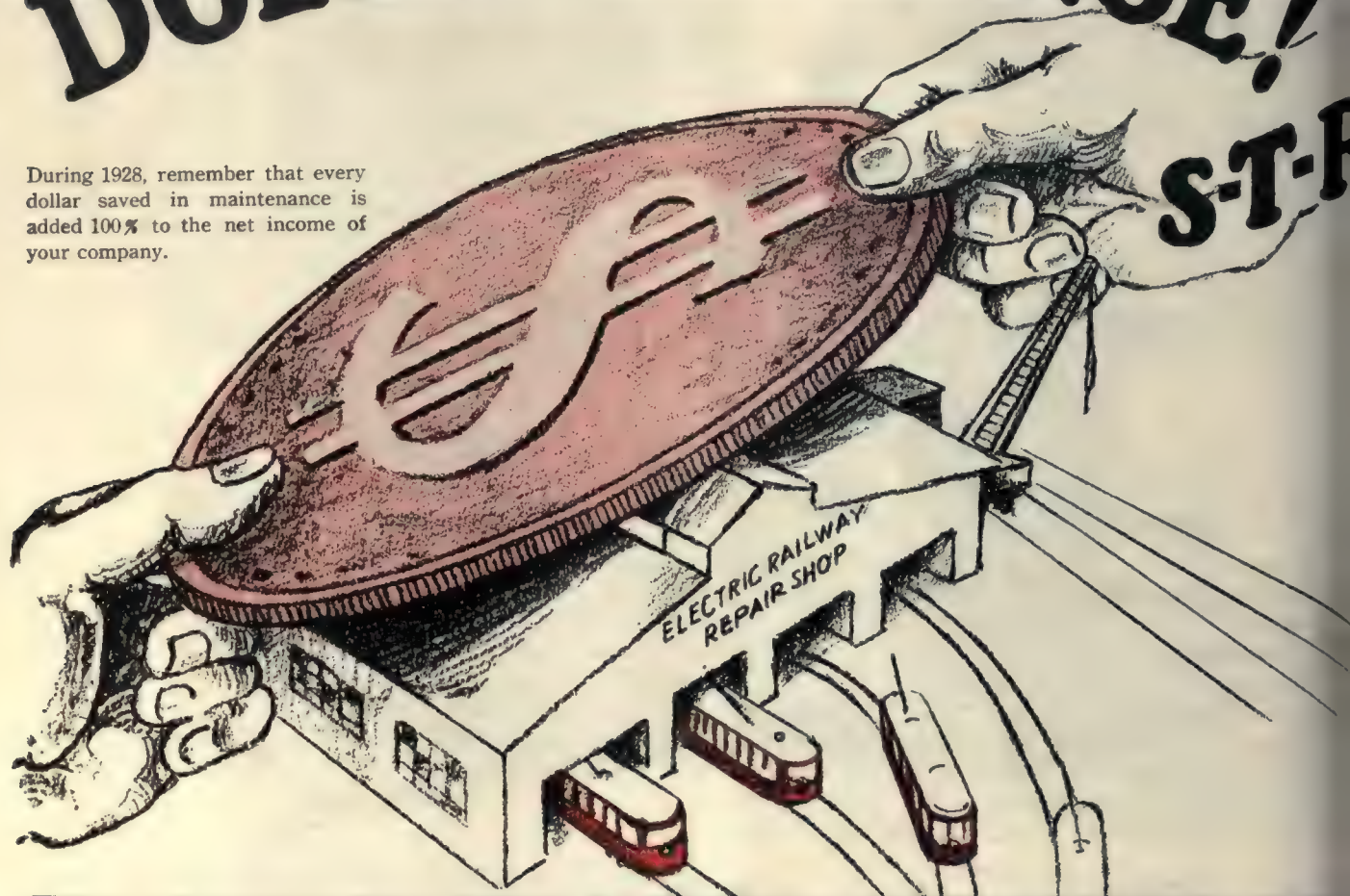
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Chas. N. Wood Co., Boston
Electric Engineering & Mfg. Co., Pittsburgh

H. F. McDermott, 208 S. LaSalle St., Chicago
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DOLLARS AND SENSE!

During 1928, remember that every dollar saved in maintenance is added 100% to the net income of your company.



O-B Marathon Trolley Ear
Exceptionally long life—200,000 to 400,000 car passes; far fewer ear renewals and line breaks; less cost per year for labor and materials; these results explain world-wide use. Cat. page 534.



O-B Duplex Trolley Frog
A modern design overlapping runner frog suitable for any degree of turnout. Has renewable body or pan. This is easily and quickly replaced without disturbing supporting span or trolley wires. Installed in original location; no adjustment needed. Cat. Supplement p. 572-A.



O-B Type C Splicer
Holding power exceeds strength of new wire. O-B Tapered Approaches, very narrow cross section and flat, smooth under run, result in minimum disturbance to passing trolley wheel. Quickly installed. Cat. page 542.



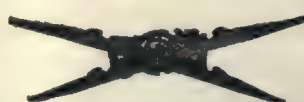
O-B Titon Bond
Large heavy steel terminals open on side facing rail. They make good welding easy, insure large contact area high mechanical strength, excellent conductivity. Internal copper sleeves protect strands against vibration. Cat. page 667.



O-B Spring Lock Hanger
A shock absorber that takes the hard spots out of the overhead. Provides a cushion between ear and bracket arm or span. Affords smooth, quiet operation, less wear and depreciation. Cat. page 465.



O-B Section Insulator
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O-B Live Cross-Over
Cam Tip Approaches and Graduated Runners prevent arcing, pounding trolley wheels. Result—less vibration and wear, fewer line breaks. Has deflector bars and combined brace and pull-off ring. Cat. page 579.



O-B Insulated Cross-Over
A thoroughly seasoned hickory beam impregnated and varnished, provides a sturdy and durable insulating member. End castings are Flecto galvanized malleable iron. Wire is held by rocker clamps, the holding power increasing with tension. Cat. page 584.

T-C-H-I-N-G the Maintenance Dollar - through EQUIPMENT

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dollars and cents savings amounting thousands of dollars a year on single of O-B Equipment have been and are made daily on scores of properties, large and small.

figures have been published from time showing exactly what the savings on some items of O-B Equipment is, and how they are made. O-B Wheels and O-B Marathon Ears, for example, afford two striking examples of economies. You can easily estimate, by making your own service tests, what of O-B Equipment can save on your car property.

Take, for purposes of comparison, one or all three of the factors which largely determine the maintenance cost of any item of equipment, namely,

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- 3—Time required for installation and replacement, when necessary.

The result is certain, because it is on this basis that all O-B Equipment is designed and made. It is on this basis that O-B Equipment has won industry-wide recognition and usage. Investigate, today, some of the O-B devices illustrated. Ask your O-B salesman for particulars, or address

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PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES



Trolley Catcher
Catches and holds a flying trolley. "Anti-step-up" feature prevents damage to trolley. Cat. page 758.



Trolley Retriever
Automatically stops and retrieves a flying trolley. Cat. page 760.



O-B Tomlinson Automatic Coupler
Makes both air and electric connections. Coupled and uncoupled automatically from platform. Interlocking disconnecting switch insures safe operation. Cat. pages 780-878.

Improved O-B Wheel and Harp



For city service only. Eliminates all oiling. Reduces maintenance and replacements. Prevents rapid wear on overhead. Cat. page 778.



O-B Form 4 Base
Floats on Timkens. Has perfectly balanced spring assembly. Insures instant response to every variation of the overhead; low upkeep, long life. Cat. page 776.



ZP Special Headlight

A prismatic reflector headlight for city cars. Gives ample pick-up and illuminates both sides of track. Takes 23 to 94 watt lamps. Extremely shallow design—3-inch extension beyond dash. Low first cost and low maintenance. Cat. supplement, page 25.



Type SDP Headlight

Takes 250-watt lamp. 12-in. dia. glass or metal reflector in Gold, Crystal or Sterling Ray. Casing sheet steel. For suburban or interurban service. Cat. No. 28579.



Would you try to row a boat with one oar?



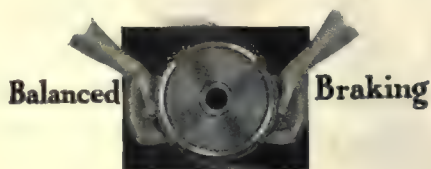
It can be done, but the inefficiency of steering against the turning effect of the one-sided force is obvious.

Similarly, balanced braking (the double shoe clasp type) is vastly superior to the single brake shoe rigging. The heavy braking load is equally balanced on opposite sides of the wheel. There is no shifting of the journal box bearing; no unbalanced load on truck frames and truck springs; less brake shoe wear; less journal box wear; fewer hot boxes; fewer slid-flat wheels; smoother and shorter stops; less train resistance in starting.

In other words, dozens of advantages—all making for economy and better transportation service.



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CLASP BRAKES**



AMERICAN STEEL FOUNDRIES

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OF THE WELL-EQUIPPED
CAR

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Gongs**

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ELECTRIC SERVICE SUPPLIES Co.

MANUFACTURER OF RAILWAY, POWER

AND INDUSTRIAL ELECTRICAL MATERIAL





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The illustration shows one of the fifty cars recently put into service by the Worcester Consolidated Street Railway—they are all equipped with the Westinghouse Variable Load Brake.

- 1** Greater Safety . . . same degree of retarding force on loaded and empty cars.
- 2** Reduced Delays . . . short stops permit cars to keep abreast of the traffic stream.
- 3** Faster Schedules . . . uniformly quick stops permit longer peak speed operation.

The Westinghouse Variable Load Brake automatically adjusts brake cylinder pressure as car weight changes—permitting maximum retarding rate throughout range of passenger loading.

WESTINGHOUSE TRACTION BRAKE CO.
General Office and Works, Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES

THE PACEMAKER



DAYTON TIES

The Pacemaker

DAYTON TIES

The Dayton Tie is a pace maker. Records of performance and long life established by Dayton Ties have earned the confidence of the Electric Railway Industry.

Long life—lasting smoothness—vanishing track maintenance costs—low rolling stock maintenance—these are all the results of Dayton Tie Track Performance.

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Dayton Ties have contributed largely to the solution of the Paved Track Problem.

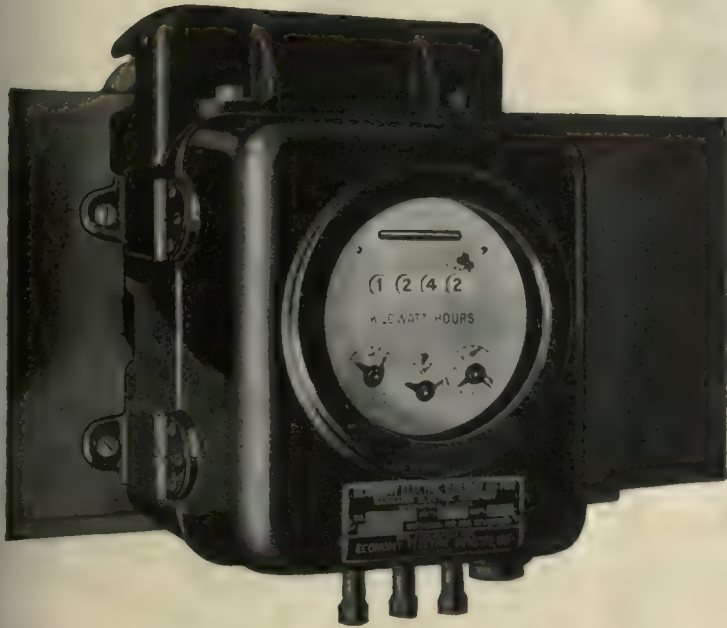
Dayton Tie Track is always Smooth

THE DAYTON
MECHANICAL TIE CO.
DAYTON, OHIO



TO REDUCE MAINTENANCE Install Economy Meters

For Electric Railways

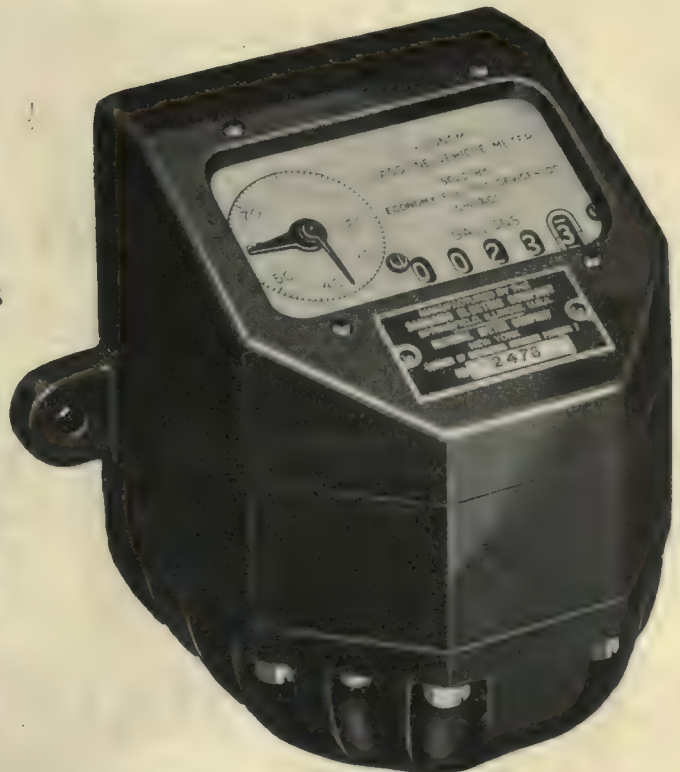


Economy Electric Railway Meter

The ECONOMY Watthour Meter has cut the consumption of energy in two hundred cities all the way from 10 to 20%. This reduction in power consumption is due to better operation of the cars. Better operation of cars means decreased maintenance. In addition the car inspection dials set the interval for inspection in a thoroughly scientific manner. Regular systematic inspection also means reduced maintenance.

For Automotive Transportation

The ECONOMY Gasoline Vehicle Meter furnishes the bus field with an accurate method of determining energy consumption. Energy for automotive equipment is measured in miles per gallon. By means of the records obtained from this meter the condition of the equipment and the operation thereof can be carefully watched. Better operation means reduced maintenance.



Economy Gasoline Vehicle Meters

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Sangamo Economy Meters
Peter Smith Heaters

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Economy Gasoline Vehicle Meters



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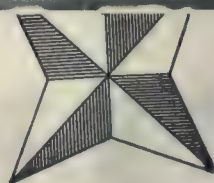
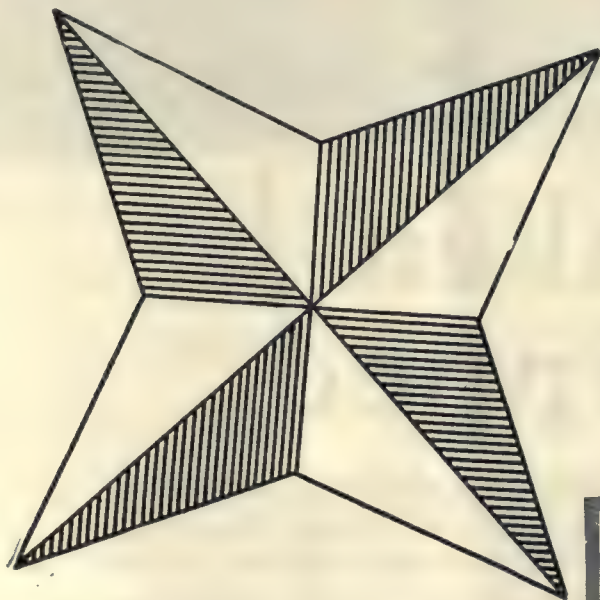
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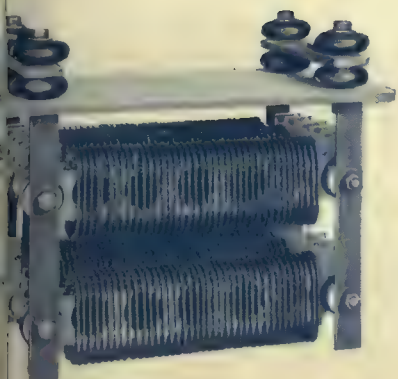
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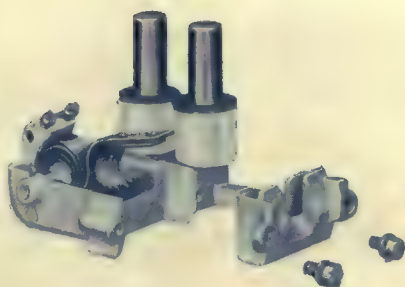
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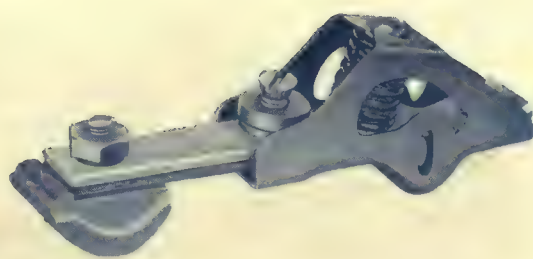
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MERCHANDISE DEPARTMENT, BRIDGEPORT, CONNECTICUT

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Progress Lags When These Conditions Exist

WHEN one asks the question, "What is the matter with electric railway maintenance?" it seems presupposed that there is something generally the matter. This, of course, obviously is not true. There are many railways that maintain their properties efficiently, and that are keenly alert to new methods and practices that will give improved results. Unfortunately, there are also many instances, particularly among the smaller properties, where several things are decidedly wrong, both in viewpoint and in methods.

First of all, the managements of some railways lack confidence in the future of their own business. Consequently they have hesitated to spend money needed to keep their properties in decent, to say nothing of efficient, operating condition. Cars are decrepit and dirty; the overhead line is subject to frequent breaks; track is bad, and it is impossible to provide a comfortable ride or to maintain a reasonable schedule.

The managements of such properties—and there are far too many of them—must make up their minds or the public will do it for them. A transportation system cannot survive and prosper without the good will of its patrons. That good will and patronage cannot be obtained unless the property can put up a good front. Nothing succeeds like success, and the appearance of failure is soon accepted as evidence of the fact. The physical condition of a property also affects the attitude of its personnel; and thus there is set up a destructive cycle that can have only one inevitable result. The effect of this situation upon the maintenance forces of some properties is nothing less than pitiful. There one finds the type of master mechanic who has patched and scrimped so long that his one remaining hope is that of finding a new job with a management that has confidence in the future of its own business.

In contrast to the road which lacks a leader is the property with surplus shop facilities but inadequate organization, where costs are high and methods inefficient because the man in charge is occupied with other matters than his primary responsibility—maintenance. The problem is one of organization and general policy.

Finally comes the property on which the maintenance executive is self-sufficient and the methods and costs are clothed in secrecy. Little interest is taken in what others are doing and pride of authorship is the dominating impulse. Comparisons of costs, of pull-in records and of track failures with other properties, when they are made at all, are set up not for the purpose of self-improvement but as evidence to make an impression on the management.

In effect these constitute the three general classifications of the answer to the question "What is the matter with electric railway maintenance?" Progress lags when

any of the conditions outlined above exists on a property. These are all matters for the attention of the management, for upon the elimination of these conditions depends the improvement of maintenance practices throughout the industry.

Adequate Facilities and Careful Preparation Needed to Secure Good Painting

SUCCESS with any system of painting depends on the care used in preparing the surfaces to be painted and the attention paid to putting on the various coats. Paint is used for two principal reasons; first, as a protective coating to prevent rapid deterioration, and second, to give a good appearance.

Paint or enamel may be put on by brush, spray or dipping. Each has its place and its limitations. Regardless of which process is used, however, too much emphasis cannot be laid on the proper preparation of the job and the correct application of the under coats. Unless the surface and under coats are right the finish coats will fail, no matter how good the materials. Good results can be obtained from a number of standard painting systems, if proper precautions are taken. All sappy spots in the wood should be carefully shellacked. Cleanliness is a prime requisite. Surfaces should be cleaned thoroughly before any painting is done, and metal surfaces must be brushed off to remove rust. To insure a good job sufficient time for drying must be allowed between coats and after the final coat. Many details of shop facilities affect the cost of painting and the character of the finished job. Rolling steps and scaffolding that are easily and quickly adjusted will help speed up the work. Adequate lighting is most essential.

Touching up and patching have assumed greater importance due to increased street congestion. Painted surfaces are subjected to frequent scratching and damage. This has led some to advance the suggestion that an extremely long life for the painted surface is not desirable since it will soon be scratched and marred anyway; and so in order to make a good appearing job it will be necessary to paint cars at least once a year.

Car cleaning methods and materials have an important bearing on the life that is obtained from paint. In modern cars steel is used extensively. The many pockets, window corners, etc., accumulate dust which retains moisture and leads to rusting. In the campaign for better appearing cars much attention has been given to various color combinations and cars are being repainted much more frequently than in previous years. Regardless of the particular painting system used, the whole question of satisfactory results is coming to involve more and more consideration of the conditions under which the paint is applied and handled.

Cheap Products Make Expensive Repairs

CONTINUITY of service is the first requisite in the transportation business. It is an old saying that a standing car earns no dividends. Freedom from breakdowns on the road is the greatest factor in keeping the cars moving, and so should be the goal of everyone connected with maintenance work, from the laborer up to the general manager and even to the board of directors. In the very nature of things it cannot be otherwise, for no public utility can hope to survive long unless it gives that character of service the public has the right to expect.

The greatest factor in preventing breakdowns is in doing the work of maintenance as it should be done. It is not enough to patch up a defect so that the car or bus can go out on another trip. It is necessary to know that it can go out and make many trips without the ever-present danger of a failure on the road. When a maintenance executive is choosing between methods or materials he should always keep in mind this need for reliability. Particularly in the purchase of parts and of supplies there is an ever-present temptation to shade off the price. When the salesman tries to sell an article on the basis of price, and still claims that the quality is identical, it is well to keep in mind the slogan adopted by one prominent advertiser: "You can teach a parrot to say, 'Just as good.'" Unless it is a staple product where the quality is invariable this slogan may be remembered to advantage. Even here there often is a chance for shading in one way or another.

The first cost of the best materials and the most efficient labor is not so great as often is imagined. Substitutes seldom have the quality of the original product, no matter how hard the salesman tries to convince the purchaser. Of course, it sometimes happens in the progress of the industry that materials and parts available when the original equipment was built were not as good as those available today. There should be no hesitation in adopting the new and better part if it will increase the reliability of the service. Oftentimes serious defects in the original design have been eliminated in this manner by the railway's maintenance forces. There may also be a chance to reduce the cost of the repair in this way. But there should be no tendency to cheapen the method or the quality of the products used.

Permanent Track Repairs Economical in Long Run

NEARLY as much money is spent each year by the electric railways for track maintenance as is spent for track reconstruction. There is, however, an important difference between the expenditures for the two purposes. Maintenance expenditures are spread over a large number of small jobs no one of which costs very much, while track reconstruction expenditures are made for only a comparatively small number of jobs, each of which is fairly costly and usually is covered by a specific authorization. The result of this situation is that maintenance jobs often receive less engineering attention than do reconstruction jobs, and much good money is wasted in unscientific repairs.

Joints ordinarily are the largest item in track maintenance. Strangely enough, many electric railways follow the same practice in joint repairs today that they did twenty years ago, although they certainly would not use in new construction the same methods that they used ten

or even five years ago. Following old maintenance methods is largely the result of a false idea of economy. Although figures differ considerably in various cities, it may fairly be said that it costs about \$50 to open up a joint, repair it and restore the pavement. While the work is open the cost of a permanent repair is only a few dollars more than that of a temporary repair. If the repair is not made permanent it will not be long before the pavement has to be opened up and the work done over again; yet many railways continue to make temporary repairs on the assumption that they are economizing. They will open up the joint and make a repair which may last only a year, at a cost of \$50, while a permanent repair can be made at a cost of perhaps \$60 or less, that would last for many years.

Many other instances of this sort might be mentioned. Temporary repairs to special track work are frequently made with similar false economy. During the course of a few years a railway may spend far more than it would cost to do a good job in the first place—more sometimes than it would cost to install new special work. The idea seems to be that "it's just a small job and we'll do it as cheaply as possible." There is a tendency to forget that the real cost of any track job is measured by the length of time it lasts. Since the total annual expenditure for maintenance is nearly as large as that for track reconstruction, it is obvious that higher standards of maintenance practice offer the opportunity for economies comparable to those which have been effected through improved construction methods.

Deferred Shop Improvements Lead to Bad Practices

IMPROPER facilities in the electric railway shop decrease the quality and increase the cost of railway maintenance. Poor equipment and improper arrangement of working appliances increase the length of time required to make a repair while untidy and uncomfortable surroundings reduce the morale of the entire crew. A dirty and untidy shop cannot keep high grade mechanics.

Will a man inspect a controller and make with his bare hands the close adjustments that are necessary, when the air is so cold they are numbed; or will he spend the proper amount of time and do his work carefully under the car when he is standing in a muddy pit, timbered with rotting boards? Undoubtedly he will not. Neither will he work properly in dark and dingy places.

Some properties require their men to work in barns, not car-houses. Not only are the general working conditions poor but often the tools and equipment have long since ceased to be usable. How can a man tighten a bolt properly if the wrench refuses to grip or has a handle too long or too short? How can accurate machine work be done on second-hand machine tools that have been discarded by others but purchased by electric railways that won't spend the money needed for efficient machines? These conditions soon grow on the foreman as well as the individual workman. The men must then work, not only under bad conditions but without a leader to set a proper standard.

Lack of tidiness has a similar effect. Men cannot work in a greasy cluttered up shop any better than an executive can work in a dingy, messy office. Materials should be properly stored and such things as castings, wheels, lumber and scrap should be in their proper places and not form part of a general clutter. Scaffolding and ladders should be of proper design so as not to hinder

the worker and should be convenient for handling. The pit construction should be open and kept clean.

The average workman can be led to take sincere pride and interest in his job, provided he is given proper encouragement. But no man can do good work with poor tools or in uncomfortable or dirty surroundings. There are too many instances where financial difficulties, franchise problems or other unfavorable general operating conditions lead to the total suspension of all shop and machinery improvements. Then, when a reorganization is completed or a new franchise arranged, the pendulum swings to the opposite extreme; a very elaborate shop is built and, to utilize these facilities, the property embarks on a program of home manufacture that is open to serious question. What seems to be most essential is a better understanding of the need for gradually improving maintenance facilities as a means of effecting operating economy. Regardless of how hard pressed a property may be financially, appropriations for needed maintenance improvements must be given attention. Any other policy is obviously false economy.

Attention to Detail is Secret of Freedom from Electrical Troubles

IT IS probably generally agreed among maintenance men that the electrical equipment is the very heart of the electric car, and that freedom from electrical failures is essential to a favorable pull-in record. That being true, one would expect to find that the maintenance costs and troubles on a property are in inverse proportion to the age of the electrical equipment on its cars. Other things being equal, that should naturally follow; and it does follow where the standards of maintenance procedure are comparable on two properties.

Unfortunately, however, there is a wide diversity of maintenance procedure and standards, and one sometimes finds that the property with comparatively modern electrical equipment does not show in full the favorable record of service failures and maintenance costs which is to be expected. What then is the explanation? One does not need to go far for the answer; it can be summarized almost in one word, "thoroughness." Particularly with respect to the maintenance of electrical equipment, attention to detail is the secret of low costs and freedom from service failures.

Examine the practices of the properties that are making the best records on pull-ins and equipment maintenance costs, and one is immediately struck with the care that is exercised in the overhaul of electrical equipment. The parts are stripped from the cars so that they may be thoroughly examined, cleaned, reinsulated if necessary, and tested to make sure that they will stand the same degree of abuse as when they were received from the factory. This applies to motor field coils, armatures, controllers, line switches or circuit breakers, and motor leads. Each of these parts is carefully cleaned and is inspected and tested on the assumption that it conceals a potential service failure. Then it is reinsulated either by merely dipping and baking or by actual replacement of insulation where deterioration is evident. Finally, after the parts are again completely assembled, they are subjected to severe tests in the shop, designed to bring out any hidden weakness before they go back in service.

Of course, on some properties, where the practice of repairing failures has been continued for many years in place of a policy of anticipating and preventing them, the condition of electrical equipment is such that the

adoption of a thorough overhauling policy like that outlined above, will cause a temporary increase in maintenance expenditures. But it has been amply proved by the records of properties that have stuck to this policy for several years after once adopting it, that the money spent for putting electrical equipment into good condition is an over-all economy. It is far cheaper in the long run, to anticipate failures rather than to repair them after they occur. Attention to details while the equipment is in the shop for overhaul is the secret of the success of those properties that show consistently favorable pull-in and maintenance cost records.

Close Supervision Essential in Maintenance Departments

ONE trouble with many maintenance shops is that the man at the head of the organization does not really know what is happening in his own department, and among his own workmen. Instructions are issued, but the several departments are not followed up by the man in charge to see that they are carried out. Instructions or orders do little good unless enforced. The maintenance executive is frequently too far out of touch with the practices of his own department to give that quality of executive supervision upon which the performance of his whole department depends.

To get real results from the men actually doing maintenance work requires that the advantages of any improved practice be "sold" to them through their foremen. All doubts that may arise in the foreman's mind as to the desirability of using a particular method or material must be removed at the time that instructions are issued. Ideas are hard to transmit, and for that reason, the complete execution of a policy is achieved only when the head of the department keeps closely in touch with what is being done and with the men in charge of the work.

Some busy executives feel that they do not have the time to maintain direct contact with their forces, or with the work which is being done. This is usually a result of inadequate organization or of an improper conception of the maintenance man's responsibility. Executives should take the time necessary. Direct supervision of shop and carhouse methods is of more importance than the affixing of signatures to reports and documents where the signature of a subordinate would do just as well. Sometimes the lack of proper supervision is attributable to the fact that much of the executive's time is occupied with matters involving the manufacture of parts or equipment on the mistaken theory that an economy is effected. This is probably the chief indictment against "home manufacture"—it occupies the time and attention of the limited supervisory staff at the expense of maintenance.

Along with proper supervision must go recognition of satisfactory work done by individuals. Stimulation of initiative and enthusiasm is possible only when the head of a department has direct contact with the men on the job. Keeping equipment going after it is built has a tendency to become monotonous. Such routine operations as turning wheels, packing bearings, adjusting brake rigging, slotting commutators, tightening track bolts, splicing trolley wire, etc., enlist little enthusiasm unless each man's part in the operation of the property is kept constantly before him. When he is made to realize that inspection is for the purpose of avoiding service failures, and that a car pull-in is a serious matter, his part in the company's success takes on increased importance.

Maintenance Practices That Permit Failures Cost Money



The practice of driving bearings into housings is wrong—too much force may crush the bearing and cause it to pinch the shaft—A loose bearing soon wears on the outside and damages the keyway

WHILE making a recent survey regarding gaging of wheels the writer visited a number of rail-ways to obtain information as to just what variation was allowed and how closely their wheels were kept to gage. On one property the master mechanic told me that all wheels when tested were exactly to gage. I replied, of course, that there must be some variation, as it was impossible to bring them all to exact measurements, and there must be allowed a certain tolerance. He said, no, there was no tolerance allowed and suggested that we go out and check some. We measured the gage of a number of wheels in the shop which had recently been pressed on their axles. We found a variation of as much as $\frac{1}{4}$ in. either way from correct gage. He was quite surprised, so we watched the workman who was pressing on the wheels. After he had pressed the wheels on we asked him to test the gage again. Looking at the measuring gage he used I noticed it had a spring attachment at one end. Asked the reason, he said that with a stiff gage if the wheel was pressed on a little too far the gage would be bent or broken, and so might become distorted easily. In order to prevent this he had placed the spring attachment on the end so that if the wheels were pressed on too far the spring would be compressed and do no damage to the gage. He evidently had overlooked accu-

Close supervision, high-grade workmen, modern tools and good materials are necessary. With any of these lacking, improper practices will creep in

By Clarence W. Squier

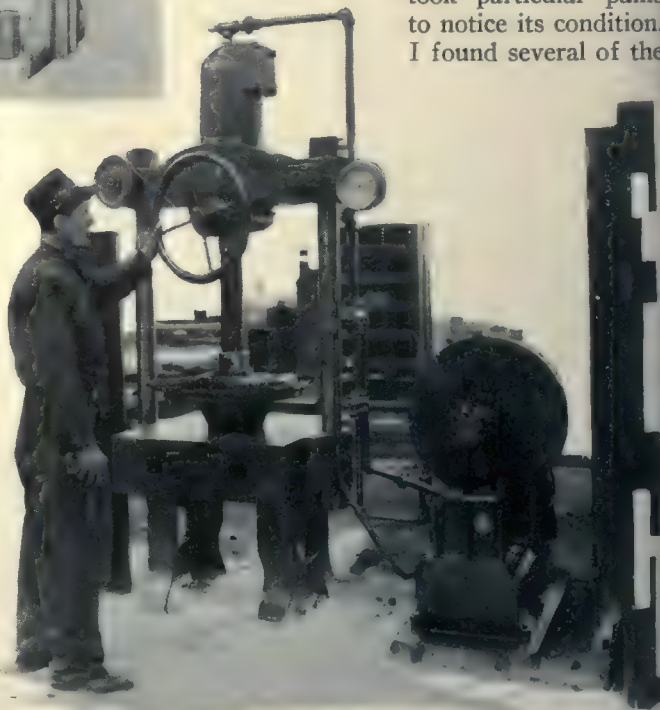
Associate Editor *Electric Railway Journal*

racy, for the spring attachment allowed considerable play and the gage itself was very inaccurate. Here the master mechanic, who was passing the wheel press constantly, did not know the situation in his own shop.

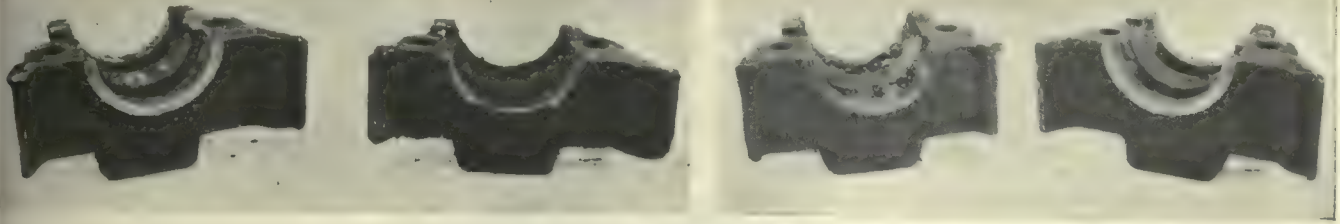
One of my visits was to an interurban property where some light interurban cars had been placed in service about a year previously. These cars had been admired as a long step forward in providing passenger comfort and convenience, and the road had been obtaining gains in passenger revenue. Of course I was anxious to ride on these cars and note their condition. In going out to the headquarters of the company where the shops are located, I boarded one of the new cars and took particular pains to notice its condition. I found several of the



A bearing press without a gage is little better than the sledging method



A modern bearing press in the Coney Island Shops of the B.-M. T. The gage shows the pressure obtained



Worn axle caps are a source of danger. Two of those in the illustration are worn more than $\frac{1}{8}$ in.

heaters under the seats were loose. Screws had come out and no attempt had been made to fasten them, so the heaters were shaking and making a disagreeable noise. Also, some of the arm rests of the seats were loose, which did not add to the passenger's comfort, as they were intended to rest his arms on rather than to be a source of annoyance.

Many other things about the furnishings were in a slipshod condition. While they did not actually interfere with the operation of the car, they gave it an untidy appearance. About halfway to the shop, we came to a siding where a car coming in the opposite direction was off the track. I got out to see what had caused the trouble and noticed that the wheel flanges were very sharp. I then looked at the wheels on the car on which I was riding. These also were sharp. Evidently no attention had been given to the replacement of wheels.

When I arrived at the shop I was not surprised that so little attention had been given to maintenance of the equipment. This particular day was raw. Snow and rain were falling and it was very disagreeable outside. In the shop I found conditions even worse. The pits were just holes in the ground; they were not cemented and the bottoms were filled with mud and water. There were a few lamp outlets along the edge but only about half of them were working. There was no wheel press and no lathe for turning wheels. All this work, I learned, was expected to be done outside. I asked the master mechanic if he was paying any attention to the wheels. He said that he had noticed the flanges were getting very sharp, but the general manager had discouraged sending the wheels away. I told him of the derailment and that evidently this was caused by sharp flanges. He said that perhaps a couple of accidents would impress upon the management the necessity of doing something immediately. This situation was very bad, as some extra fine equipment was allowed to get into bad condition through improper attention to maintenance details.

Later this road replaced all of its wheels and in doing so increased the diameter from 26 in. to 28 in. so as to get more mileage from the wheels. The value of low step height, which featured the original design, was forgotten.

SOMETHING ABOUT REWINDING ARMATURES

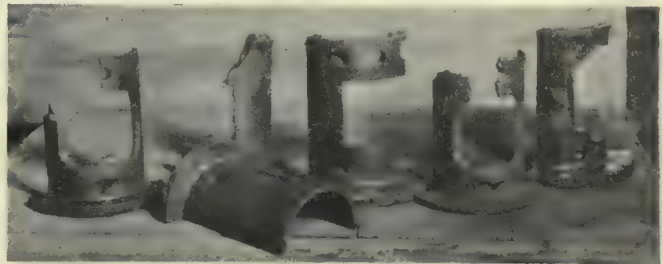
Speaking of antiques in America, I am reminded of a curious method of winding armatures which I happened to see on one of my visits not long ago. It was in connection with an old motor, so I asked a lot of questions. The workmen were insulating the pinion-end coil support of the armature and were following almost to the



Dreadful examples of armature bearings—bulged walls, patched and keyways destroyed



Loose axle bearings cannot be held satisfactorily by dowels. They soon break out



Constant pounding of loose axle bearings soon results in conditions like this

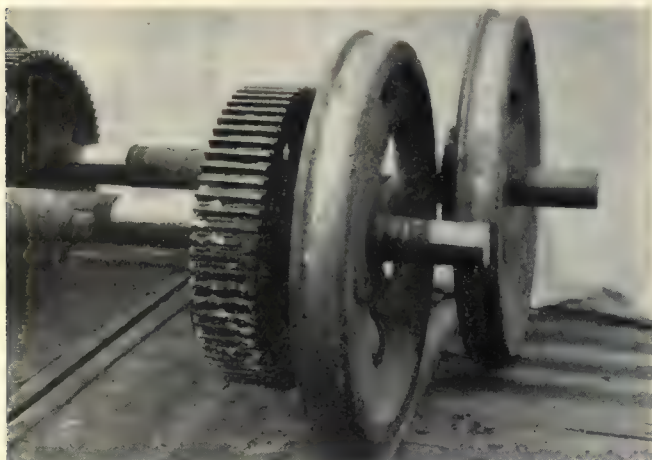
letter the original practice. On this particular motor layers of insulation were built up to give the required thickness to fill the space up around the coil. The workmen were using a heavy fibrous paper cut to the required width and length and slotted to conform to the curvature of the armature. To make the paper pliable it was soaked in water and while still wet it was placed on the coil support. Before the paper had a chance to dry out it was shellacked to hold it in place. Just imagine what a nice damp place the armature coils had to rest on and the steam engine effect when the motor went into operation! A property of this kind offers a fertile ground for an engineering investigation.

Another practice which should be relegated to the dark ages is that of cutting out armature coils to avoid rewinding. On one of my visits I asked the superintendent of equipment to show me how he would cut out an armature coil. He looked at me with a merry twinkle in his eye as he said, "Of course, we would only allow such a thing as an emergency measure and see that the car was operated in light service. This practice should be placed among the lost arts, but still there are few armature winders but who know the process well." We then went into the shop and inspected the armature room. Strange to say, the armature foreman was having a coil cut out. The particular armature involved was reported in for an open circuit. Here is the process which was followed: Alcohol was poured in the slot and

ignited to soften the insulation so that the coil could be lifted with a minimum of damage. After the coil was raised out of the slot the insulation was stripped off and the open coil located. The ends of this coil were cut off short and taped. The coil was then wound to its approximate shape, reinsulated, and pushed back in the slot. On questioning, the foreman admitted that sometimes as many as three repairs of this nature were made on one armature before it was rewound. Yes, he said, the motor did flash some, but he thought that this procedure reduced maintenance expense, as it saved the price of a new set of armature coils. Can you imagine the expense of removing the armatures from the car, the possible delays in car service, and the general foolishness of the whole procedure?

A COAT OF VARNISH MAY COVER A MULTITUDE OF SINS

Impregnation of field coils has become an accepted practice by most electric railways. On one property the master mechanic told me about certain economies which he had introduced so as to cut down the time used in



Mounted wheels staggered in storage may damage a carefully finished journal or axle bearing surface by rolling the flanges against the axle seats

impregnating his field coils, and so get the repaired motor back in service sooner. I asked if he was sure that he had not injured the quality of the product, and requested him to have one of the coils opened up. This coil was a revelation. The impregnating compound had not penetrated below the first two or three layers. The inside of the coil was white, indicating lack of treatment.

Anyone knows that if it takes ten operations to do a job right the use of only five of the operations will result in a lower-priced product with a corresponding inferior quality. Poor treatment of field coils results in breakdowns from moisture. Low-grade insulating materials and skimping of the required amount results in breakdowns, expensive delays and costly repairs.

We have heard much about the damaging effects of spread gear centers during the last five years. Superintendents of equipment have attended various committee meetings and discussed the subject; these men, together with their general managers, have visited conventions and listened to papers on the subject, but so far as doing anything on their properties, well, they have promptly forgotten about it. When you talk to these men they all admit that spread gear centers are an evil that should be remedied, but they are almost always of the opinion that

such a condition does not exist on their property until they are actually taken out and shown.

How can it be demonstrated that a spreading of gear centers actually exists? One of the easiest methods is to open the trapdoors over the car motors so that their action can be watched, then set the brakes and apply power to the motors by notching the controller on and off the first point. Excessive movement, if noticed, can be accounted for only by excessive wear in axle bearings, between the outside of the axle bearings and the axle cap, between the armature housing and the motor frame, between the armature bearing and the housing, or in the bore of the bearings themselves. As most of the wear of axle bearings is in the top portion, a common method of testing is to lift the motor at the axle suspension by means of a pinch bar. While this is being done, inspection will show how excessive is the movement.

Superintendents of equipment and master mechanics, when asked why they do not remedy these conditions, are likely to give lack of funds as one of the first excuses. They say that if they asked the general manager for money he would immediately turn them down. In order



The protective covering used in the shops of the Department of Street Railways, Detroit, Mich., prevents damage to journal bearing surfaces and keeps them clean

that these men may have some sort of a report to present to the general manager and so convince him of the bad condition of rolling stock, it is desirable to make a test as outlined on all equipment and report the number of cars and equipment showing excessive wear. Of course, such a report should recommend means to remedy the trouble, and include a summary of costs. Axle bearings and the bearing fit of the axle bearing in the motor frames are the worst offenders as they do not receive the close attention that the armature bearings do. Of course, the wear inside the bearings can be taken care of readily by fitting bearings to the axles, and truing these up to proper dimensions.

A common practice is to replace axle bearings at the carhouses whether or not they are held tight by the motor and caps. No check or attention of any kind is given to this important repair and the axle seats are not examined. As long as they run, they are left alone, and attention is given them only if some part of the bearing breaks.

Electric railway managements can see the extent of this evil by requiring that the bearings removed be held for inspection. Then the reason can be determined why the bearings were replaced by new ones.



A journal box cover carelessly left partly open may soon result in contamination of packing and oil and bearing failure



Strands of waste hanging outside journal box may soon siphon off the oil and result in a hot bearing



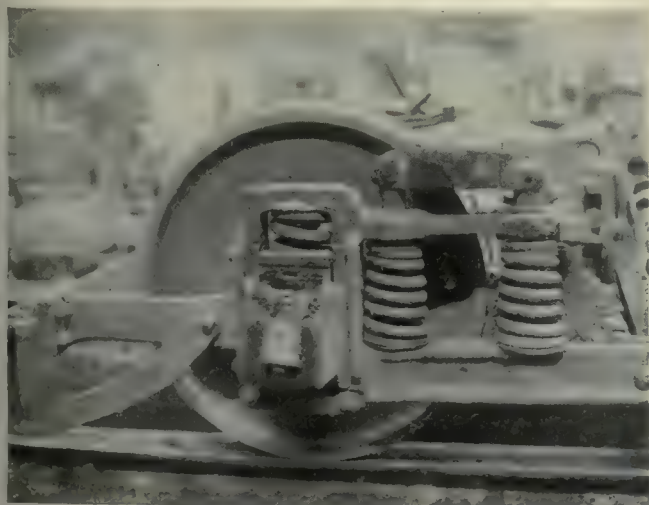
This shows where much of the gear grease goes. More attention to gear case fitting and axle collar will pay

In the course of time motors are welded and rebored because the fits have become so worn that they can no longer hold a bearing and the mileage obtained from the bearings drops to from 5,000 to 10,000 miles. Managements will find it a paying investment to check such conditions at once. It should be ascertained if new bearings when put in motors are tight after the cap is bolted up. Put a set in a motor that is standing on the shop floor and hit it with a wooden mallet. Then take the same motor when it has been placed in a truck and use steel feelers to determine clearances between caps and bearings, also between the bearing and the axle seat. A good strong electric light will help materially in checking clearances. Remove the waste from the axle cap and throw water on the end of the bearing to see what effect wheel wash will have. See how much water enters the caps and what effect this would have upon waste and oil.

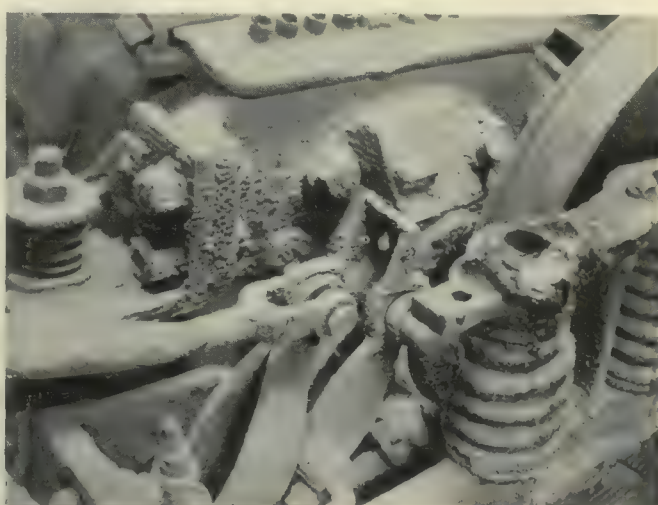
To take care of wear on the outside of axle bearings and on the inside of the frame and at the axle caps, two things can be done. On most types of railway motors the axle bearing fit can be rebored to a size slightly larger,

probably not more than $\frac{1}{8}$ in. Then oversized axle bearings will give the desired fit. Where the wear is so great that reboring may lessen the strength of the motor support at that point, the best practice is to build up the inside of the frame and axle bearing by welding and then re-machine to standard size. Much of this excessive wear and looseness at the axle bearing support is a direct result of improper use of the clamping fit provided, for originally the axle caps were bored out with shims between the frame and the surface. When bearings were installed and these shims removed the desired clamping is supposed to have been obtained.

The trouble that comes from this practice is due to variations in machining. Suppose the outside of an axle bearing should be 7 in. It may vary a few thousandths from this. Most railways accept bearings with a variation of from 0.005 to 0.010 in. either way from normal dimensions. The same is true of the bore of the axle bearing frame and axle cap fit. When these are machined with the shims in place, there is sure to be a variation in diameter of from 0.005 to 0.010 in. The general



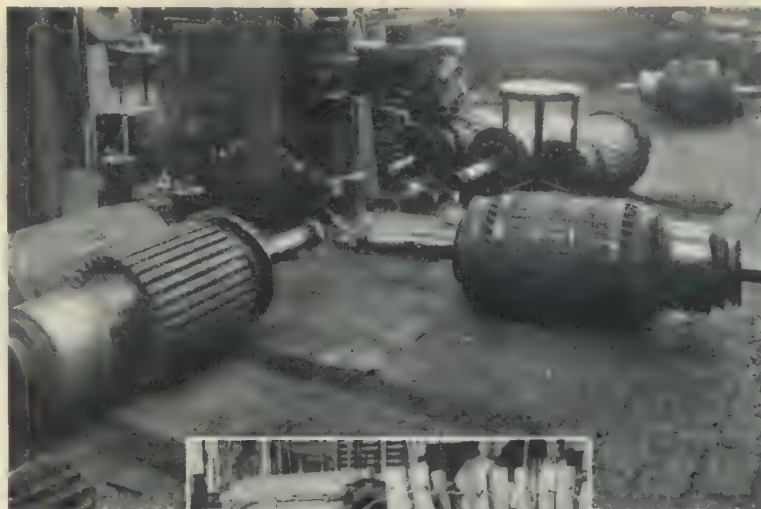
Journal box covers knocked off in service give no protection to the oil and packing. Clean oil and waste are essential if the number of hot bearings is to be reduced



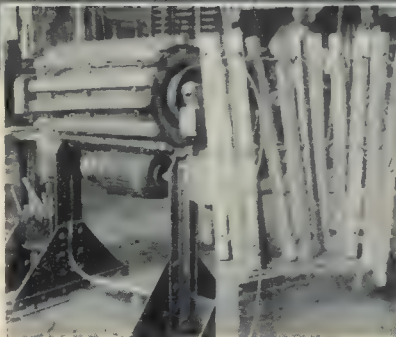
Railway motors are subjected to extremely dirty conditions. Covers should be kept tight and never opened until the surrounding mud has been cleaned off

practice is to use shims of a thickness to take up approximately from 0.014 to 0.017 in. When these are removed, there are sure to be variations in the fit. On some, the clamping will be excessive, and others will actually be loose at the start.

How can this condition be remedied? In the first place, for all axle bearings a machining tolerance of from 0 to plus 0.005 in. should be specified. No axle bearings should be accepted if the diameter is less than normal. In the same way, the machining tolerances for the



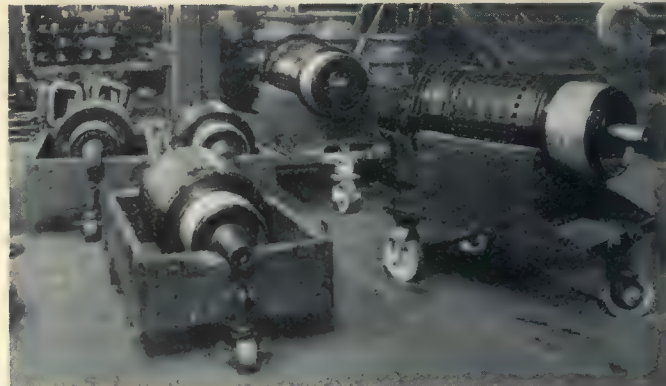
Storage or placing of armatures near machine tools is dangerous—Turnings or drill chips may cause a short circuit or grounded coil in service



As shown at the left, the New York Railways protects armatures with a wooden harness consisting of strips held together by rope

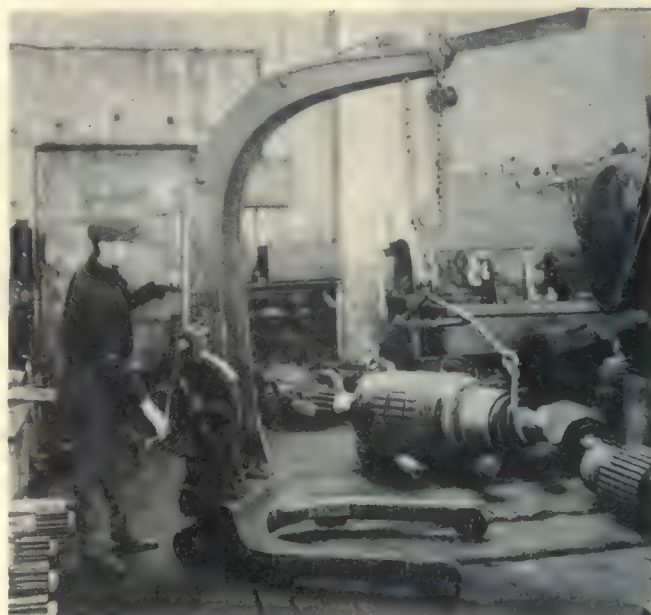


Armature buggies form a convenient means of transporting and protecting armatures in shops of the Brooklyn-Manhattan Transit system



Large armature trucks in the Coney Island shops of the B.-M. T. Company. Several of the steel trucks at the right are hauled between departments at one time by a shop tractor

bores of the frame and axle cap or the axle bearing fit, should be from 0 to minus 0.005 in. and none with greater than the normal bore should be accepted. A clamping action is then sure to result, and the maximum variations in the clamping will be from 0.010 in. down to normal. With these machining tolerances, distortion of the bearings from excessive clamping will not result, so there will not be danger of bearings running hot due to their being decreased in the bore by tight clamping fits. To obtain co-operation of the management in making a thorough rehabilitation of equipment, master



The Eighth Avenue Railway uses a portable crane of this type for handling armatures about the shops

trouble there is not so great since they are watched more carefully and excessive wear at these points is usually taken care of immediately. Otherwise, rubbing of the armatures on the pole faces of the motors and damage to windings is sure to cause large expenditures. As a result, master mechanics and superintendents of equipment have no difficulty in keeping these fits within desired limits, since general managers have come to realize that it is far cheaper to keep the bearings in shape than it is to pay several hundred dollars for re-winding an armature.

One of the greatest

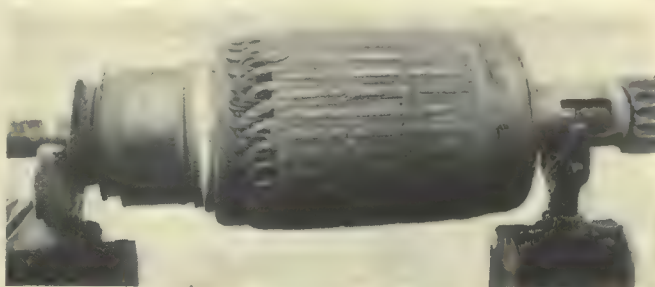
mechanics should get the results of their inspections forwarded to the manager's desk. They should be sure that the reports tell fully what is needed to bring the motors back to a satisfactory condition. At the same time it will probably be advisable to ask for proper tools and some facilities to carry on this work. At the start recommendations for improvements should be made which eventually may lead to better work.

Much of the argument given for axle bearings is equally good for armature bearing fits. The

sources of difficulty with armature bearings is due to their being placed in the housings loose, or else driven in with too great pressure. This will not happen if every shop has a press with a gage on so as to show the exact force with which armature bearings are pressed into the housings. Manufacturers of the bearings have issued instructions giving the proper force with which bearings should be pressed in. A maximum of 5 tons, and a minimum of 3 tons is good practice for bearings of ordinary size. In visiting various railway shops I have found the most general practice is to drive these bearings in with a mallet. Where there are presses, many are not provided with gages and no attention is paid to the proper pressure.

Contrast this procedure with that used in wheel pressing. On every electric railway the wheel press is provided with gages. Pressures for putting on wheels are watched very closely. If excessive, the wheel is pressed off and the trouble is found immediately so that the pressure will be kept within the desired limits. Graphic records of pressures for fitting the wheels are sent to the office of the superintendent of equipment, and sometimes to the general manager's office for his information. They are scrutinized carefully, and any wrong practice is immediately checked up and the foreman warned. A similar system should be adopted for armature bearings. A record should be kept of the pressure at which each armature bearing is put in. Copies of the records should be sent to the offices of the superintendent of equipment and the general manager. It will thus be evident to all concerned what pressure is being used, and the cause of a loose bearing or a tight bearing will be easy to locate.

I have seen cars with newly-equipped armature bearings placed in service and run less than a single trip before overheating resulted so that it was necessary to turn the car in. Examination has shown that such bearings actually were distorted due to pinching while being driven into the housing. This caused the hot bearing. On one system where it is the practice to spin every motor after new bearings are installed, I asked the superintendent of equipment to flood the housings with oil and run each motor for ten minutes and observe the results. The third motor tested developed a hot bearing. It could not be laid to lack of lubrication since the bearings were flooded with oil. On removal the bearings were found distorted, pinching the shaft.



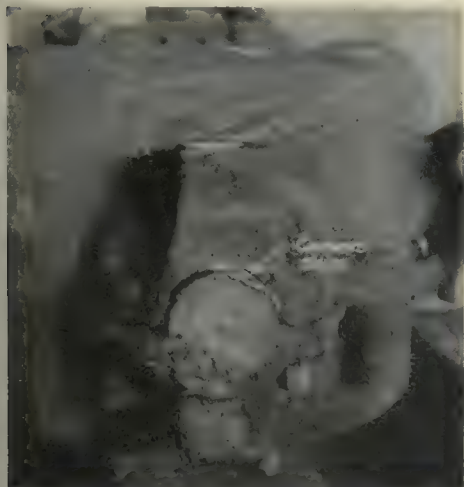
An armature coil cut out and returned to service may tie up operation and cause several hundred dollars worth of damage

Equipment men are beginning to understand that an excessive amount of oil is cheaper than excessive wear on bearings or their overheating. They probably do not understand that excessive wear happens mostly when they attempt to introduce economies by reducing the amount of oil used. If the general manager, or whoever is responsible for lubrication practice, would sit down with his pencil and paper for a few minutes and figure out just how much a slight increase in oil will cost, he would be surprised. Suppose oil is costing 32 cents a gallon. There are 32 gills to a gallon so the cost would be 1 cent per gill. Suppose also that twice as much oil is used so that instead of taking 1 gill for each lubrication, 2 gills are applied. With the usual method of adding a gill of oil to each bearing every thousand miles, the total amount used per year per bearing would be 1 gal. If this is doubled, the extra cost would be 32 cents per year per bearing. How much do bearings cost? \$8 to \$10. Which is better, to increase the life of the bearing or to pay a little less for lubrication?

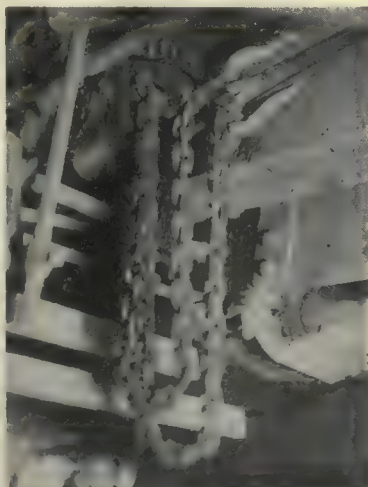
Suppose it were possible by some means yet unknown to supply a barrel of oil to each bearing in a year. The cost of a barrel of oil would be about the same as the cost of one bearing. If the life of the bearing is doubled, there is still a saving of half the price of the bearing.

Of course, the amount of oil used should not be excessive for too much oil may cause trouble as well as too little. General managers should do a little thinking along this line.

At the present time, there is a great deal of talk about reducing noise. Reduction of wear is the surest means of reducing noise, so that whenever a general manager talks of reducing noise he really means reducing the



A canvas shim around part of an armature bearing of an old motor has worked around to the top and closed part of the waste opening



Improper adjustment of brakes may allow chain to be taken up entirely before brakes are applied completely



A quick method of closing a hole in a sand spout. Stuffed with paper little sand will flow when needed to prevent a collision or avoid an accident

amount of wear. The thing to do is to impress upon maintenance workers that the general managers are willing to spend a little money in reducing this wear and so they will not be afraid of reporting excessively worn conditions.

Money spent for such improvements will ultimately reduce maintenance cost, for high-grade maintenance is an economy. If there appears any doubt regarding this, study the records given out regularly in the statements of the Electric Railway Association of Equipment Men, Southern Properties. Pick out the systems that have the best pull-in records and see if their maintenance costs are excessive.

Usually, it is not fundamentally the fault of the superintendent of equipment or the master mechanic that the excessive wear takes place. These men try to conceal these conditions from the general manager. They know that asking for more money is out of the question so they try to do the best they can without saying anything. If they were made to feel that their general managers want to correct such bad practices they soon would make the effort, for all are vitally interested in keeping equipment up to the highest standard.

Few equipment men take the trouble to find out what



Worn-out hand tools may cause accidents to workmen and damage to expensive equipment

has happened to the oil after it has been in the housings for some time. The superintendent of equipment of a railway recently told of a number of tests on lubrication that had been made and said that as a result he was then using the best type of lubricant that he could get. This meant an increase in the cost of approximately 75 per cent over what he had used previously. He said that the tests showed that the better lubricant was more than worth its price in the length of life obtained, freedom from wear, and freedom from trouble. "That's all very good," I said, "when bearings are newly fitted and filled with new oil, but what is the nature of the lubricant after it has been in service two or three months?" "Suppose we find out," replied the superintendent. We went to a car that had been in service some three months, pulled the waste and took out some samples of the oil, which we placed in bottles and set aside. The next day we examined them. More than half of the contents of the bottles was a thick sediment or water. A large amount of foreign material had been introduced into the oil through improper handling, and through the entrance of dust and dirt, either through openings in the bearings or in the covers of the motors themselves. There is no use of paying a high price for lubricants if they are allowed to get dirty so soon.

Water is thrown up off the streets, and if the parts are loose or poorly fitted it enters the bearings. How many of our electric railway readers would operate an automobile if it had a hole in the side of the crank case? None, I venture to say. Then why operate cars in such a condition?

Careful Training of Workmen Insures High-Grade Door Maintenance

By GEORGE E. OAKLEY

Consolidated Car Heating Company, Albany, N. Y.

DEFFECTS in door operating equipment cause delay, aggravate passengers and crews, and sometimes necessitate taking cars out of service. To minimize these troubles it is essential that the equipment be as simple and reliable as possible and that it be maintained properly. It is a very important part of the present-day car equipment, as quality of service depends to a larger extent on the operation of the doors than with previous designs of cars.

Reliability of the door equipment itself is affected to a large extent by its installation on the car. The apparatus must be located and arranged so as to allow it to function in the manner intended. There must be sufficient clearance provided for the doors, levers, and similar working parts, in order to eliminate binding, and the levers and connecting rods must be laid out so that they will work to the best advantage. Much faulty operation of doors and steps can be traced to a cramped arrangement of the mechanism. It is also important that the apparatus be installed so that it will be convenient for inspection and repair, as experience has shown that operators will slight equipment which is difficult to be reached or seen.

Another thing that is essential to prevent trouble and insure proper operation of the door equipment is education of the men whose duty it is to look after the apparatus. Such instruction should not be confined to the men actually doing the work on the equipment but the foreman in charge should also be instructed so that he fully understands the value of having parts inspected carefully. In fact, in order satisfactorily to maintain door operating equipment, it is essential that the foreman understand the construction and operation of the equipment so well that he knows how and why each component part of the apparatus functions. The foreman will then be in a position to instruct the men working on the equipment and will be able to judge from their reports of trouble found whether the actual causes have been located. If the workmen are none too familiar with the equipment and do not know where to look for the cause of the trouble reported, they are likely to grope around and do something that apparently improves the operation but does not remove the real cause. This results in the car being turned over as ready for service only to be soon again reported as defective.

The instruction of new men assigned to this equipment should be done by the foreman and not by the man who has been working on it or who has had some experience with it. This latter procedure will result in the new man getting only a smattering of knowledge of the equipment and he will not be qualified to do the work properly.

On account of the different types of equipment in service, no attempts will be made to give detailed suggestions of how inspection and overhauling should be done. Instruction books or rules for this procedure can be obtained from manufacturers. However, all concerned should understand thoroughly that co-operation with the manufacturer in this work of instructing the men is most essential.



Proper insulation between trolley circuits reduces spanwire maintenance

Neglected Overhead

Is Poor Economy

Many railways have increased car speeds and weights and added power load without improvements in overhead. Small factors of safety are insufficient when deterioration occurs. A slack trolley wire is the lineman's enemy

By L. W. Birch

Assistant Manager Railway Sales Division Ohio Brass Company

OVERHEAD line engineers would consider the ideal trolley circuit to consist of a single, straight, unsupported wire paralleling the running rails at the desired height. But in practice there are curves, feeder taps, pull-overs, grades and special work. There are the ears and hangers at frequent intervals for support and insulation.

The direct suspension line almost universally adheres to a 100-ft. pole spacing for tangent track—a 100 ft. of unsupported trolley wire and a hammer blow, another 100 ft. and another hammer blow, and so on. This hammer blow is obtained at the support or attachment, whose function is to support and insulate the trolley wire. In performing these two functions the attachment must provide clearance for the trolley wheel or shoe, must have the maximum life commensurate with the materials employed and size of assembly, and must be as free from pounding as possible. We all

know the effects of pounding at the cars—worn trolley wire, worn trolley wheels, dewirements, trolley base trouble, motor trouble and the uncomfortable vibration set up in the car roof. While this pounding is characteristic of all overhead, the degree of pounding is quite variable with different properties. Our problem then may be found on any property. It is to suggest a means of lessening the impact at the ear or support point.

Many properties have attempted to decrease the pounding by using a slack cross-span wire. This method is not always satisfactory, as a slack cross-span wire allows the dead weight of the hanger and ear to develop the maximum blow. With this arrangement the ear and hanger are moved upward through the pressure of the trolley wheel obtained from the springs in the trolley base. A hard blow is the result. Now consider a tight cross-span wire. In order to retain a tension of 1,000 to 1,800 lb. in the span wire (usual tension for tight



Supporting catenary in city streets presents many problems for the overhead man



span wire), the poles must be set carefully and, in most cases, guyed. A mechanical tension of this value will tend to deflect the unguyed pole, and with the guyed pole the down guy will be taut. As a trolley wheel approaches an ear there is a tendency to unload the span wire. That is, the upward thrust of the trolley pole decreases the loading at the ear point with a consequent decrease in span-wire tension, which throws a lesser loading on the pole and it tends to straighten up. The pole deflection diminishes. The result is a slight rise in the span wire as the trolley wheel reaches the ear, hence a lessened blow.

Still further relief can be secured through the combination of ear and hanger. On round trolley wire the ear surrounds the wire. The greatest holding power of the ear is secured through the section under and adjacent to the boss. This is evident when it is remembered that the ends are tapered to provide a smooth under-run for the wheel. The long ear will afford this gripping power and easy approach. The short ear (5, 6, 7 and 9 in.)

must have an equivalent supporting section which reduces the taper at the ends. Pounding results, and a short life of ear and wire may be expected.

Again, the tilting of the long ear will not aggravate the wheel blow in the same manner as with the short ear. The approach end of the long ear may lift the same distance as the short ear, but due to its length, it will not present such an abrupt angle for the wheel to strike. The hanger is also important. Recent experiments and installations have proved that by using a cushioned stud, a blow on the under side of the ear is partially absorbed by the cushion, or spring, back of the stud. This is important on bracket arm construction where the span wire is only about 9 ft. long and cannot offer further relief to the blow.

With catenary construction there is also a hanger problem which falls in the category of "hard spots and hammer blows." One reason for choosing catenary is its smooth under-run. The early lines were built with rigid hangers, which, although they provide a smooth under-run, permitted some pounding at the trolley wire clamps. This type was replaced by a loop hanger which permitted of an unhampered rise of hanger and trolley wire, irrespective of messenger wire, during a trolley wheel passage. This was a step in the right direction. But another factor contributing to "hard spots" appeared—hanger spacing. A recent inspection of a catenary system with hangers spaced at 50 ft. intervals showed that it was only a slight improvement over direct suspension. Fifty feet of trolley wire supported by short catenary clamps (2 in. long) fostered wire wear and mechanical difficulties in the overhead system. At least one additional hanger should be inserted between the present hangers. And if the railway wishes to maintain operation in the event of a trolley break, two additional hangers should be inserted. This will give $16\frac{2}{3}$ ft. hanger spacing so that a broken trolley wire will not reach the ground and anneal.

A slack trolley wire is the lineman's enemy. It can cause more pounding at the ears than any other combination of conditions. The slack trolley wire usually is found over the track with light traffic as the result of



Many roads have outgrown the direct-suspension overhead by increasing speeds, and using heavier trains that require more current

deferred maintenance. With a slack trolley wire the first trouble is pounding at the ears. As this increases, ears wear out and slip off and dewirements take place. Due to whipping between cross-spans excessive trolley wheel wear occurs, trolley base repairs start and motor troubles develop. Lastly, the wire wears thin at the ears, breaks, and then a new wire must be installed.

If there are only a few frogs or other special points in the overhead, the slack may be removed by cutting in a splicer, which should serve for a period of years. Due to infrequent service, which means long life for a trolley wire, the cross-span wires may get out of line, with respect to the poles, by cutting out slack. This defect is not serious. The span wires can be realigned during the next ear replacement. It is no exaggeration to say that a splicer used for slack removal may double the life of a trolley wire.

The choice of trolley wire size and kind must be considered by the user for his particular conditions at the time of purchase. For catenary work a grooved wire is preferable. The bump-bump-bump of a wheel over the small clamps or ears on a catenary hanger will not only produce arcing and burning of the wire but will drive the hangers in the direction of the car travel.

RUSTPROOFING PAYS

In many instances the blow of a trolley pole striking a bracket arm has crumbled the pipe and dropped the overhead. What did the inspection reveal? The pipe exhibited extreme corrosion. Many bracket arms manufactured with painted C tubing have been erected. The paint does not protect the pipe more than three or four years, when corrosion sets in. Along the open seam in the C tubing, moisture creeps into the interior of the pipe. Corrosion starts there. In a few years the pipe is dangerous. A 100 per cent galvanized job would have cost less than \$1 more, and the pipe and fittings would have been protected for many years.

Another trouble develops from the rusty pipe bracket arm. Drip water from the rusty pipe and fittings falls on the insulated hanger and strain insulators in the span wire. Eventually an iron deposit is built up and leakage over the insulation starts. Drip water from rusty overhead also is a problem for the equipment man. Stained car windows, dingy bodies and coated roofs are an eyesore and a hazard. Good galvanizing is an asset to the equipment man.



With this construction, alternate poles carry the high-tension line, thereby eliminating half the high-tension equipment

In this article no attempt will be made to discuss the relative merits of the direct suspension system and the catenary system other than is necessary to emphasize fully the thought brought out in this discussion, that is, "Correcting Common Errors in Overhead Line Maintenance." A comparison in some detail was given in an article by the author in *ELECTRIC RAILWAY JOURNAL* for July 9, 1927, page 59. Each system has its place in the field. With this thought in mind, a logical question may be asked: Have the railways chosen their overhead systems wisely? There are many interurban roads that have built and maintained direct-suspension lines over private rights-of-way where tangent track predominates, where the curves are of low degree, where the time between terminals is being reduced constantly, and where heavy trains require considerable current. Possibly the overhead was erected at a time when catenary overhead was not good enough for consideration. But this does not alter the present-day condition. It usually is con-

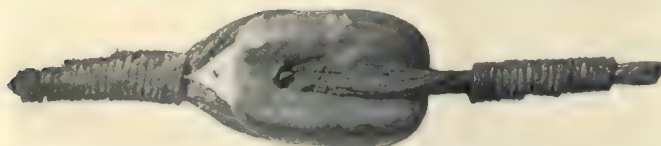


Direct suspension in this storage yard made possible the use of self-supporting steel poles

ceded that a catenary overhead system is selected primarily for speed, greater current carrying capacity and conductivity. Factors that may seem secondary, but that are vital, are low maintenance, less abuse to collecting equipment, greater vision, less insulated suspension points and appeal to the public eye.

SPAN WIRES AND SPAN INSULATION

There is a tendency on many properties to use single-strand (usually No. 8) galvanized iron wire for pull-overs. True, this wire is of sufficient strength to withstand, with a small factor of safety, the mechanical tension usually imposed on it. But what of corrosion? And what of the shock received by a span wire or pull-



This sample of corrosion was taken from a span in service twelve months along the sea coast

over wire due to the hammer blow of a trolley pole following dewirement? A single-strand galvanized iron wire will not withstand these blows for long, and it will not resist corrosion over a period equivalent to the life of the pullovers. Again there is a needless expenditure.

A piece of $\frac{1}{4}$ in. or $\frac{5}{16}$ in. regular grade messenger wire, with core wire protected from corrosion, will withstand the ordinary blows of a trolley pole for many years. Flexibility is obtained, guarding against fatigue of the strand, and it is easily handled by the line crew. The cost is little more than for the single strand.

In many localities steel strand is not used with success. An excellent example is shown in an accompanying illustration. This insulator and $\frac{1}{2}$ -in. galvanized steel strand had been in service exactly twelve months when it was necessary to renew the entire span wire and many others in the immediate vicinity. This wire was taken from a section of overhead paralleling the sea coast but is characteristic of many other localities. After replacing steel strand for many years at the rate of one new set of span wires yearly, this company finally resorted to a bronze span wire which is giving excellent results, and reducing the maintenance on the coast section to a figure which is justifiable. A bronze messenger wire also is to be recommended for coast service.

In many instances span wires over multiple tracks fail to carry insulation between the trolley wires. Usually an insulated hanger is used. However, on many pass tracks and yards an uninsulated hanger is used with insulation at the pole only and none between trolley wires. Insulation in the span wire between trolley wires is necessary to protect the span wire. With no insulation a current will flow between trolley wires through the span wires. This current flow sometimes sets up an electrolytic action and in other cases (due to the presence of acid from smoke) a galvanic or cell action which destroys the strand. A small amount of insulation in the span wire will break up this current flow and protect the span wire.

Most of the cell action referred to above occurs first at points where the galvanizing has been removed from the strand through flaking or through injury at the time the lineman served the joint make-up. The iron is exposed and the action starts.

There have been three accepted forms of span wire

insulation—wood, composition and porcelain. While all have proved quite satisfactory under normal city operating conditions, wood and composition have their limitations. On coastwise work, wood and composition are not very satisfactory. The example illustrated herewith where steel strand was replaced with bronze was striking in this respect. Previous to the adoption of porcelain, composition insulators were used between trolley wires and wood strains at the poles. The salt deposit in wet weather permitted considerable leakage with the consequent carbonization of wood and composition. A breakdown was the result. Porcelain insulation collects a salt deposit and in time will permit leakage, but it takes the most severe current flow to heat it and break it down.

The majority of interurban lines carry a high-tension feeder circuit on top of the pole that supports the overhead. This line may be any voltage from 6,600 to 44,000 alternating current. The wire size runs from a No. 2 up and most of these circuits are three-phase. For a 33-kv. line with a 100-ft. pole spacing the insulation, crossarms, hardware, and labor for installing will cost in the vicinity of \$700 for a mile. If this spacing should be increased to 200 ft. the cost would be halved and, alternate poles could be 30 or 35 ft. in height instead of 40 or 45 ft. Maintenance would be lowered and the leakage and the hazard would be decreased, and where the line warrants catenary, the low poles could be entirely eliminated at a later date. There are many examples of 100-ft. pole spacing on high-tension lines being changed to 200-ft. pole spacing today.

ASSOCIATION COMMITTEE ASSISTS IN IMPROVEMENT OF PRACTICES

Co-operation of overhead line engineers and manufacturers of trolley line materials through the power distribution committee of the American Electric Railway Engineering Association has improved the standards of maintenance. One purpose of this committee is to formulate standards for overhead materials, equipment

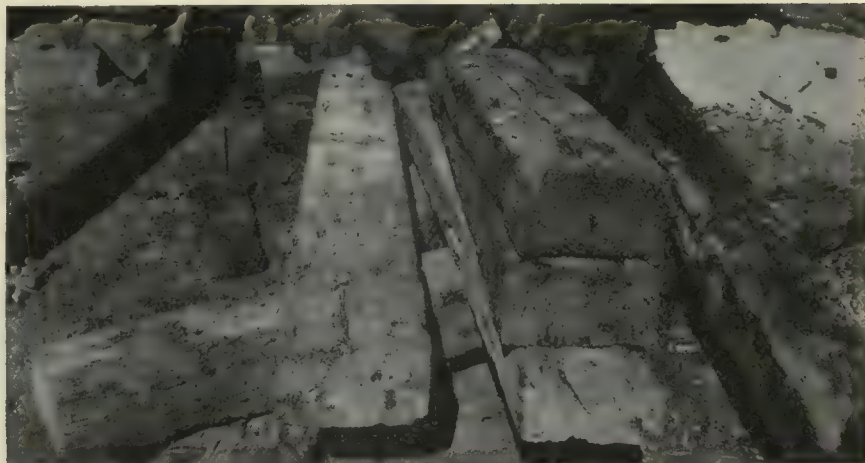
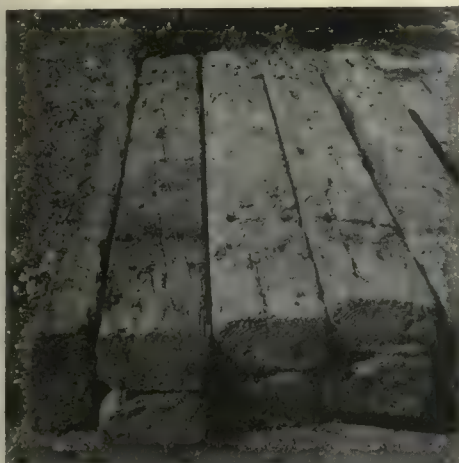


There are many worm-eaten wood strain insulators in the warmer sections of the country. They may be eliminated by using creosoted wood

and wire. Another purpose is to provide a medium for exchanging ideas of those engaged in similar lines of work. The standards created by these committees aid the manufacturer in a house cleaning which results in more attention being placed on a better line of products. However, a good line of products may be rendered partially useless through misjudgment and misunderstandings of the user. Here is where the exchange of ideas is priceless. One member calls another aside and explains how he is having trouble with dewirements on a certain type of frog. It develops that he has located the frog improperly with respect to the switch point. This is just one example of the way improvements are brought about. Another is the study of trolley wire wear. A special committee is conducting a survey that is developing much information about overhead and its care.

Impregnation Pays

With Wood Tie Construction



Ties removed from tracks of the Georgia Power Company in 1926. A large majority were found to be in good condition after 31 years of service

Georgia Power Company treats wood ties so they will last 25 years against decay and protects them against mechanical wear with steel tie plates. Maintenance cost for 1926 was but \$677.50 per mile of track

By C. A. Smith

Superintendent of Roadway Georgia Power Company,
Atlanta, Ga.

FOUR primary conditions govern the cost of track maintenance: first, the design of the work; second, the materials used; third, the workmanship and care used in its construction; and fourth, the service to which it is subjected.

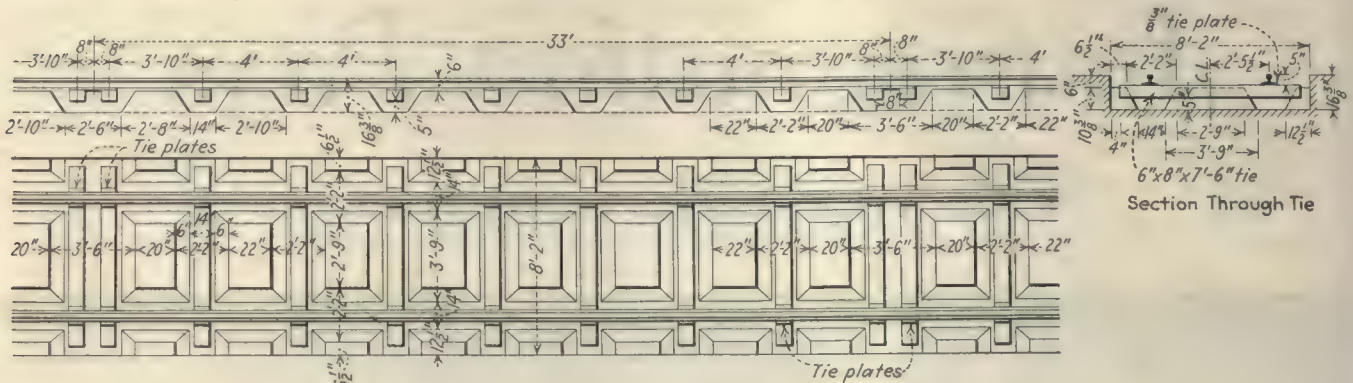
In considering the effect which the use of timber ties has on maintenance cost, I will assume that the design of the track is good, that proper section of rail is used together with correct specifications as to manufacture of special work, that the joints have been made as nearly perfect as is possible by welding or otherwise and that they are ground to perfect surface and that the workmanship is first class in all respects.

If the track is laid in a paved city street with pavement constructed so that the water does not reach the subgrade or the subgrade is drained so that it will not yield, then there should be very little maintenance cost during the life of the rail, which should be from fifteen to twenty years, depending on the volume of traffic. This is, of course, predicated on the ties remaining in good condition along with the balance of the track material. In years past much of the track maintenance was caused by the necessity of renewing ties either on account of decay or the gaining of the base of the rail into the tie,

where the tie was protected by preservatives against decay but was not protected against mechanical wear of the rail.

We have removed creosoted ties which have been in service for more than 30 years and which were in a good state of preservation chemically, but which were in bad condition mechanically due to gaining of the base of the rail. Our present practice is to preserve our timber ties against decay so that they will have a life of approximately 25 years and further to protect them by use of a steel tie plate against mechanical wear of the rail. This we figure requires a plate of approximately 72-sq.in. area.

On the system of the Georgia Power Company we have 247.73 miles of track, practically every foot of which is now built with creosoted timber or steel ties, there being only a few miles of the latter which were installed the past few years. Unquestionably, for wood construction impregnation pays. We estimate a saving in track maintenance of \$1,188 per mile of track per annum over untreated ties where track is laid in a street with paving valued at \$3.50 per square yard. With paving at a higher value the saving would be greater on account of the additional cost of tie replacement. Our



Standard concrete beam construction with wood ties used in Atlanta

This is designed for 6-in. pavement and 80-lb. A.S.C.E. rail. The joints are thermit welded. Two 8x9x $\frac{3}{8}$ -in. flat tie plates are placed on each tie. The rails are held with A.E.R.E.A. standard $\frac{1}{8}$ x $\frac{5}{16}$ -in. spikes. The

ties, 6x8 in. by 7 ft. 6 in. long, are treated with 6 lb. of creosote per cubic foot.

The concrete below subgrade for a 6-in. pavement is 0.143 cu.yd. per foot of track, and for a 7-in. pavement is 0.131 cu.yd. per

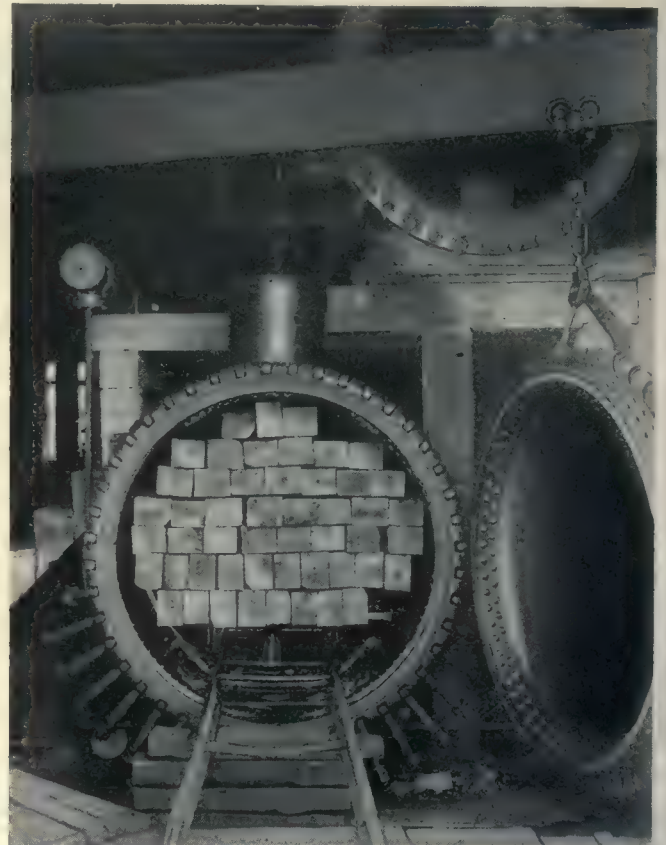
foot of track. The volume of two 5x9x15 $\frac{1}{2}$ -in. blocks beneath each tie was deducted from the concrete in figuring the above volume. Similar installations are made with Dayton ties.

maintenance cost per mile of track in 1926 was \$677.50, which is one of the lowest in the country, some systems costing as high as \$2,000 per mile.

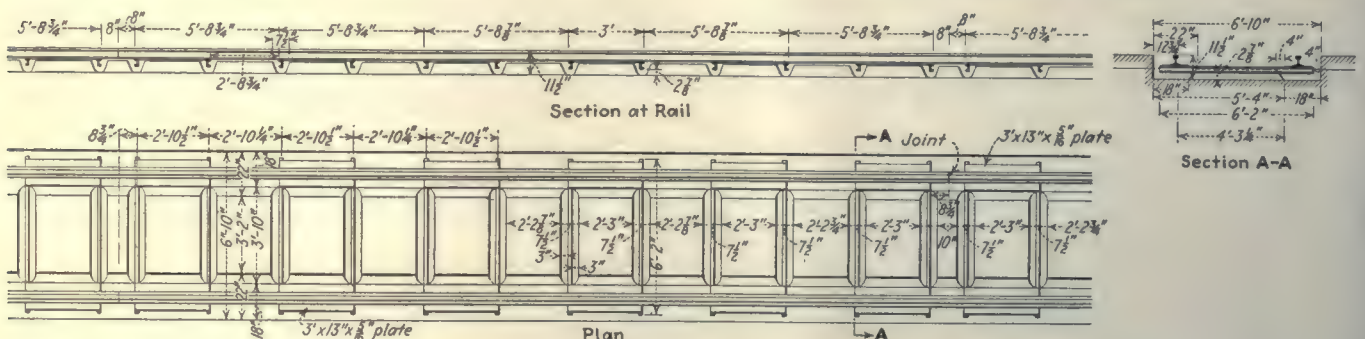
Special care in track reconstruction and improved maintenance practices on the lines of the Georgia Power Company have resulted in lower costs and less troubles. A reduction in total derailments and split switches from 270 in 1923 to 129 in 1926 is one of the evidences of increased reliability of service.

A process of laying track and paving foundation under traffic has enabled the completion of such work in 24 hours time or less. This process is to double tamp thoroughly clean crushed stone 5 in. beneath the tie, after which new crushed stone is added to bring the foundation to the required height for the paving base and thoroughly rammed. The stone is then filled to its surface with 1 to 1 $\frac{1}{2}$ grout to which 3 lb. of calcium chloride per sack of cement is added. The paving surface is immediately laid and traffic turned on it as soon as ready.

The relative advantages of timber as compared with steel ties depend somewhat on local conditions and local prices. With prices prevailing in Atlanta and with our standard beam construction using 80-lb. A.S.C.E. rail, concrete pavement and concrete foundations for the track, the cost is about equal with concrete at \$10 per cubic yard. With higher concrete cost the steel tie is more economical and with the concrete costing less the creosoted timber tie with steel tie plates is more economical. Our designs for these types of tracks are shown in the accompanying drawings. We also have similar installations with Dayton ties.



The tie treating tank at the Atlanta creosoting plant with a load of ties in position for treatment



Standard concrete beam construction with International Steel Ties used in Atlanta

This is designed for 6-in. pavement and 80-lb. A.S.C.E. rail. Joints thermit welded.

The concrete below the subgrade for a

6-in. pavement is 0.060 cu.yd. per foot of track, and for a 7-in. pavement is 0.049 cu.yd. per foot of track. The volume of ten

6x8x15-in. blocks beneath each 33 ft. was deducted from the concrete in figuring the above volume.

Speedy Service Requires

Efficient Door Mechanism

By Ray S. Frehse

Sales Engineer National Pneumatic Company,
Chicago, Ill.

SUCCESS of the modern street car is dependent in no small measure on the pneumatic door control. This part of the car equipment affects the passenger first when he enters and last when he leaves. When the mechanism is functioning perfectly the car can be expected to give the service for which it was designed. If it is not functioning exactly as it should, the schedule speed is likely to be slowed down and the passengers will obtain a bad impression of the company. However, the door control equipment is one of the easiest parts to maintain in first-class operating condition.

Continued perfect operation of door equipment requires principally careful, periodic inspection. The primary requisite is to prepare a specific schedule of the procedure in inspection so that each part will be tested in turn and none will be overlooked. The inspector should try out all of the mechanism from each of the operating positions in the car as a matter of routine. Once he has learned this procedure by heart so that it becomes a habit, he will be able to check each part very quickly. Unless a definite routine is established, something is sure to be missed which later may develop a failure in service. Like all other car equipment, in addition to the periodical inspection a thorough general overhauling should be made every two or three years.

Most of the trouble with door mechanisms comes from abuse or accidents. If the parts are adjusted properly at the regular inspection, which usually comes every ten days or two weeks, any failure to operate as they should is due to something which has happened to the doors or steps and their connections since the last inspection. The procedure then is to look for those points which are most subject to damage from the outside.

Probably the easiest way to outline what should be looked for is to give the procedure which may well be adopted at the periodical inspections. First of all, each door should be opened and closed to make sure that the mechanism moves the door to its proper position and that the steps fold up and open out as they should. The time it takes the doors to travel the full distance should be noted, as this is one of the vital features that makes for high schedule speed. In general, doors are adjusted

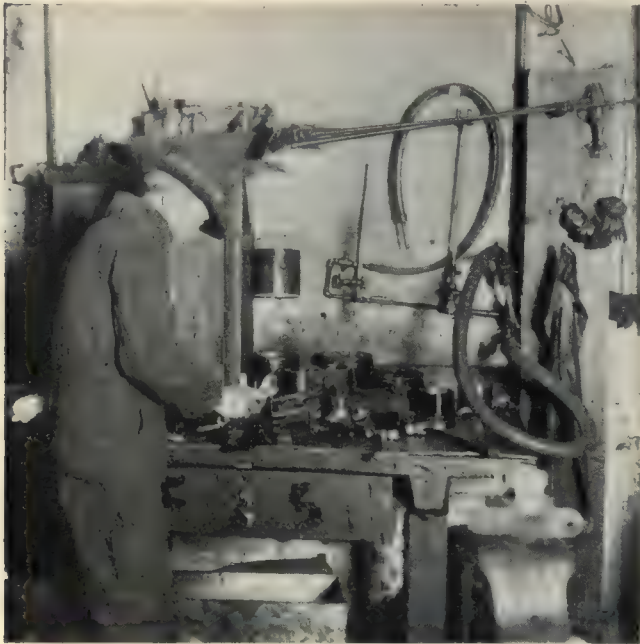


Door engine being removed from the car, dismantled and overhauled on the bench

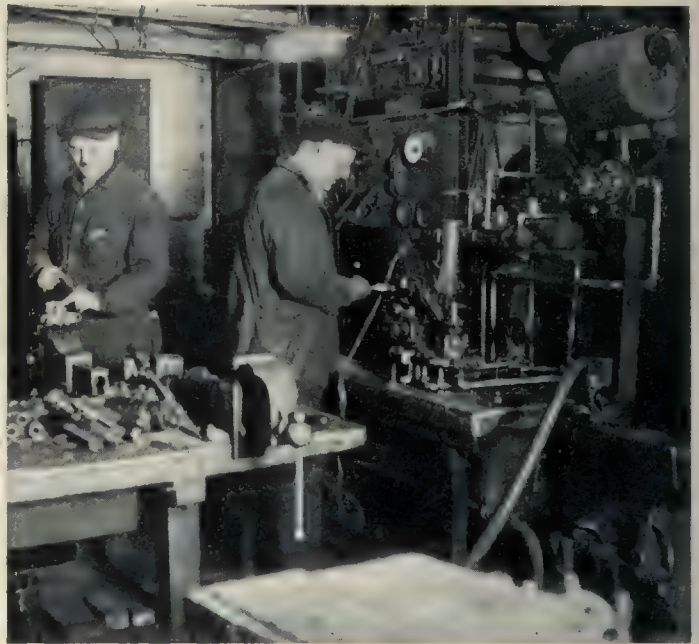
to open a little faster than they close, but they should not slam in either direction. If these requirements are not met, trouble should be looked for at once. Sometimes the step connecting rods are bent because the car has run over an obstruction which has hit them. At other times connecting rods and shafts are sprung because the trainmen have forced the steps open with switch hooks. The jam nuts should be inspected carefully for tightness, and cotter pins and pivot pins should be in good condition and in their proper places. Inspectors sometimes fail to tighten the jam nuts or leave out pins. Then the levers may slip or the rods work loose so that the mechanism is thrown out of adjustment. Failure to observe these simple rules has been responsible for poor action of doors, so that it is essential to check up at each inspection.

Leaks in piping, gaskets and valves seldom occur and when found they are corrected easily. When they exist, the doors cannot, of course, open or close at the rate for which they were originally set. It is therefore important that the inspector be on the lookout for leaks and see that none remain when the car is released after inspection.

Apart from these points, accessory equipment such as door switches, signal lights, control valves or switches, quick release valves, treadle devices and brake interlocks should be tried out by the inspector and each function observed when they are controlled from every point in the car.



Care in reassembling of overhauled door engines will save time later in making adjustments



Testing the door engine with air pressure to make certain there are no leaks, on the Third Avenue Railway, New York

One of the most common sources of trouble with door mechanisms is oil on the pin connection and grease on the door tracks. In the ordinary control these parts are casehardened to resist wear. Oil is unnecessary and when it is put on it soon collects dirt and grit so that a grinding compound is formed that wears the joints and shortens the life of the parts. When grease is put

on the overhead track it not only results in additional wear on the guides, but is apt to drop on passengers.

OCCASIONAL GENERAL OVERHAULING ADVISABLE

If the periodical inspection is properly done there is little likelihood of failures in service, and the wear on parts will be small. General overhauling, however, is desirable at intervals of one to three years, according to the severity of the service. This gives the opportunity to inspect all parts after they have been dismantled. A mistaken practice sometimes observed is to attempt to do repair work on the car. Naturally it is not possible to do a thorough piece of work and the car will go back into service with the equipment in poor condition. Every moving part should be taken from the car and cleaned, repaired and inspected at the bench under the most favorable conditions. Door engines, control valves, all switches and other pneumatic apparatus, connecting rods, levers and treadles should be handled in this manner.

Difficulties that are encountered in operation after overhaul usually come because proper care was not taken to see that worn parts were either renewed or refinished to eliminate the bad effects of wear. Valves should be taken apart in the air room, cleaned and inspected carefully. Slide and rotary valves wear on their surfaces so that they should be checked with a surface plate and reground, if necessary. Pin valves usually require renewal and their seats should be trued with a tool. For this performance it is essential that after the magnet valves are reassembled, the air gap and travel should be checked with gages that are supplied by the manufacturer. The magnets should be checked electrically to insure that they will operate at the minimum voltage. Balls in ball check valves should be renewed. They cost only a trifle and the installation of new ones will save much trouble, even though the old ones are worn but little. The ball seats should be trued up with a tool.

Grease and dirt in door engines are sometimes sources of trouble. The engines and their passages should be carefully cleaned and blown out with air. Piston packing cups are likely to harden and leak. It is better to renew



Final testing of the engine for incorrect operation may save a delay in service. The test bench should be arranged for quick installation and removal

these packing cups after the second year than attempt to keep them in service, as this is a small expense compared with the failure of a door engine. Ordinarily, a set of packing cups will go from one overhauling to the next one, or a period of two years. Gaskets, likewise, should be inspected and renewed if they appear lifeless.

Renewal of worn pins and bushings is another preventive of trouble later on. Connecting rods often have the threads damaged so that while they are off the car during the general overhaul, it is easy to hand-chase the threads to save time in reassembling.

When the equipment is reassembled on the cars after overhauling, it is quite necessary to check all moving parts for time of operation and adjust them to give the proper speeds. All pneumatic parts should be tested for leakage to be sure that they have been properly seated and tightened. If these precautions have been followed out, the door mechanisms should go back in service after overhaul in practically the same condition they were in when they were new and should function without necessity of more than the regular periodical inspection until the time of the next overhaul.

Automatic Power Supply for Cincinnati Railway

ELECTRICAL apparatus, which will be in operation this year, with a total rating of nearly 30,000 kw. is included in an automatic substation system planned by the Cincinnati Street Railway. It will distribute power to the trolleys by means of nineteen automatic substations, without attendants. The system was designed by the General Electric Company for supplying power automatically.

The new power and distribution arrangement comprises an area having a maximum radius of $8\frac{1}{2}$ miles from the city's business center, in which the automatic substations are located. Power will be supplied by the Union Gas & Electric Company. Substation locations have been selected carefully, with a view of serving the present lines, and providing for anticipated growth of the city and its railway system.

Each station is automatic in all respects. Doors are locked from the outside. Whenever a demand for power arises at any point the station serving the proper area will commence operation and continue to deliver power so long as the load demand exists, after which it will shut down and wait until it is again called upon to function. Should any one of the feeder circuits develop faults during operation, that feeder will be cleared automatically, and after the fault has been removed it will reclose automatically. The station will also protect itself automatically against other irregularities. By this arrangement each station becomes a responsible and dependable element in the system, delivering power whenever required to do so, and checking up automatically for any unusual conditions against which it must protect itself.

Superimposed over the automatic operation of the nineteen stations will be a central dispatcher who will be informed at all times, by means of an automatic indicating system, whether a station is operating, what units in any particular station are running, and what the feeder load and other readings are at any given time. The dispatcher may, if necessary, interrupt the automatic control and govern operation himself, as in the event of a fire or other similar emergency.

The plan calls for the abandonment of one substation, the remodeling of nine, and the construction of ten new ones. Each substation will contain one or two synchronous converters receiving 13,200-volt, 60-cycle alternating current from the public utility, and delivering 600-volt direct current to the railway. Three of the downtown stations will contain two 1,500-kw. converters each. Ten stations will each contain one 1,500-kw. converter, five will each contain one 1,000-kw. converter, and one station a 200-kw. converter.

The substation buildings have been designed to insure continuity of operation in the hottest weather, provision being made to conduct to the outside the heated air discharged from each electric machine. Transformers will be set on gratings through which cool air comes in at the transformer base and flows upward through the radiator pipes and out through ventilating ducts. The appearance of the buildings will be attractive both inside and out.

Each station will function in an automatic sequence as follows: While the converter is idle, a voltage relay is continuously measuring voltage on the direct-current bus, which is always energized through feeder ties from some adjoining station. If the measured voltage drops to a predetermined point, signifying a coming demand for power, the voltage relay passes on an indication to start operation. Immediately a motor-operated drum controller rotates, contact fingers energize control circuits, and the following operations take place: (1) the oil circuit breaker closes, energizing the main power transformer; (2) the starting contactor connects half normal voltage to the converter collector rings for starting; (3) the converter is polarized; (4) the running contactor connects full voltage to the converter when it has reached synchronous running speed, and (5) the converter is connected to the direct-current bus to deliver power. Meanwhile various relays have been checking to make sure the circumstances are correct for running the station, and the converter is not finally connected to the direct-current bus until this check has been satisfactorily made.

Should overload or any unusual circumstances arise during operation, the equipment can limit load or do whatever is necessary to permit continuing operation. Should conditions be sufficiently severe, however, the station will shut down. After the trouble has passed the converter will restart, but if the trouble warrants an inspection before restarting, the station will not restart and the central dispatcher will be notified.

The supervisory control, exercised by one man in an isolated room in one of the substations, is the most extensive ever undertaken. In the supervisor's office there will be a semi-circular switchboard including ten panels, each of which will carry the control circuits and indications for one of the substations. By means of control buttons the supervisor may, if necessary, perform any one or more of six governing operations, and, by means of colored lights, he will have an indication of all important operating conditions at each substation and can see that his commands are carried out.

Attention to Gearing

Reduces Maintenance of Entire Car

By E. S. Sawtelle

Assistant General Manager Tool Steel Gear
& Pinion Company, Cincinnati, Ohio



Sledging on of pinions should never be permitted

BETTER maintenance of railway gears and pinions will give greater gear life, less noise and less trouble from bearings and associated parts. One of the most common abuses of gearing is the old-fashioned practice of installing pinions with the aid of the sledge. With high-grade hardened pinions brutal sledging is apt to start trouble which some day may develop into a broken tooth or a burst pinion. Many pinion failures on railway motors are caused by incorrect installation.

A rather general belief is that if a pinion is shoved on the shaft and the nuts are tightened, it will remain tight and run satisfactorily. Experience has shown that in order to give satisfaction a pinion should be driven by its shaft through the press fit or shrink fit. The key acts merely as a safety device should the pinion loosen accidentally.

The hot water method of installing pinions has proved most satisfactory. By heating the pinion in boiling water and tapping it neatly onto the shaft, there will be a uniform shrink fit that will hold it against shifting or loosening. At the same time it will not be subjected to undue strains which are apt to lead to failures. I know of many properties on which the loose pinion problem has been solved completely by hot water applications of pinions. By the same method pinion breakages have been cut down.

The following points should be observed when putting pinions on railway motor shafts with taper fits. First, the shaft should be cleaned and free from burrs or swellings. Second, the pinion bore should be clean and free from burrs, and third, the fit of the pinion should be in contact with at least three-quarters of the surface of the taper fit on the shaft. This can be checked by rubbing Prussian blue, thin red lead and oil, or thin lamp black and oil on the pinion bore and fitting it on the shaft.



Simple arrangement by which pinions on small properties can be heated readily in boiling water and thus provide a uniform shrink fit



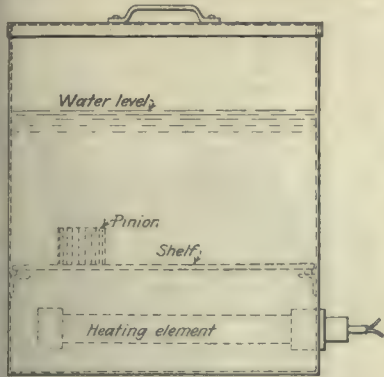
After removing the pinion from the heating tank it is shoved on the shaft with a few light taps

Before the pinion is pushed into position a check should be made to see that its keyway is of proper size for the key mounted on the shaft and also that the pinion does not ride or bind on the top and sides of the key, and will not ride the key when pressed on further. The keyway on the pinion can be 0.002 in. larger but not smaller than the key.

There should be at least $\frac{1}{4}$ -in. clearance between the top of the key and the bottom of the keyway in the pinion. The corners of the key should not cut into the fillet of the keyway. To prevent this the corners of the key should be rounded.

On some railways pinions are pressed on cold in a vertical press or a wheel press. While this may be considered an improvement over sledging, still the best method for all conditions is that of heating the pinion in boiling water. Pinions up to 3-in. bore should be heated for approximately 30 minutes, and those of 3 in. or larger bore for about one hour. When the pinion has attained the temperature of the boiling water, 212 deg. F., it should be taken out and the bore wiped clean quickly. Without allowing the pinion time to cool, it should be pressed onto the shaft. It should be understood that the pinion is not to go on with a driving fit but only with sufficient pressure to insure a proper fit. After the pinion is in position it should be given three or four light taps, using a heavy piece of wood or copper between the pinion and the hammer, distributed evenly around the circumference. This should be enough to make certain that it is well seated.

Special pinion heating tanks are used on many railways, in which the water is heated either with electric heating units, gas or steam. Where such equipment has not been purchased a substitute can be provided easily by use of a small tank or receptacle in which water can be boiled and into which the pinions can be placed for



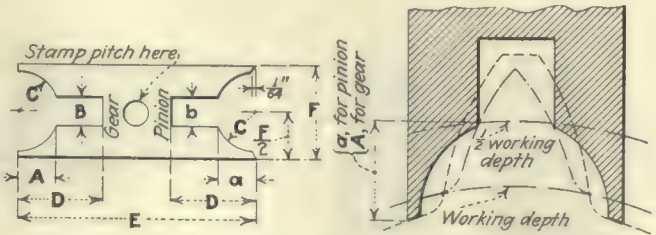
Electrically heated pinion tanks present a neat appearance and boil water quickly for heating pinions

heating. The addition of washing soda to the water in the proportion of $\frac{1}{4}$ lb. of soda to 5 gal. of water will prevent rusting of the pinions and insure a clean surface at the fit. With this method, it is possible to put pinions on armature shafts so they will stay put and drive through their fit under the very hardest pulling of the motor. Pinions may be damaged in removing

by improper methods quite as easily as in their installation. Use of a wedge and a sledge hammer to remove pinions is to be condemned. Many efficient types of pinion pullers are on the market which will not only give increased life to the pinion but also make removal easier. With most of these one man can do the work.

"She is not nearly worn out, leave her for another overhaul." This expression, sometimes heard among maintenance forces, is due to a false idea of economy. When gears are so worn that their teeth lose all semblance to the involute shape it is time to discard them. They are apt to cause undue strain on the bearings and a pinion or gear that wears out in service and necessitates a special shopping of the car will eat up all the savings that might be realized from a dozen other gears that barely manage to survive until the next overhauling period.

In 1926, the American Electric Railway Engineering Association adopted condemning gages to show when gearing should be discarded for wear. In the work of the equipment committee for several years previous replies to questionnaires on gearing showed great variations in life, much of which apparently was due to the removal or scrapping of gearing without working to a definite standard. The committee determined upon a



Discard Gages for Spur and Helical Gearing

Dimensions in inches of discard gage for spur gears—long and short addendum

Pitch	A	a	B	b	C	D	E	F
4½	0.281	0.321	0.247	0.247	1½	1½	2½	3½
4	0.299	0.339	0.262	0.262	1½	1½	2½	3½
3½	0.341	0.379	0.299	0.299	1½	1½	2½	3½
3	0.398	0.448	0.348	0.348	1½	1½	2½	3½
2½	0.476	0.508	0.418	0.418	1½	1½	3	3½
2¼	0.529	0.564	0.465	0.465	1½	1½	3½	3½
2	0.594	0.631	0.523	0.523	1½	1½	3½	3½

b is same as B for spur gear gage.

Dimensions in inches of discard gage for helical gears—long and short addendum

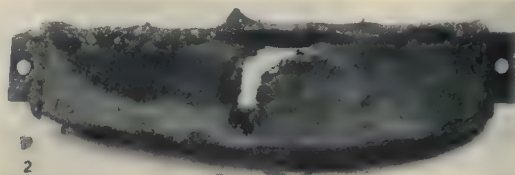
Pitch	A	a	B	b	C	D	E	F
4½	0.27	0.31	0.24	0.24	1½	1½	2½	3½
4	0.32	0.36	0.24	0.26	1½	1½	2½	3½
3½	0.34	0.38	0.28	0.30	1½	1½	2½	3½
3	0.38	0.43	0.32	0.34	1½	1½	2½	3½
2½	0.47	0.51	0.40	0.41	1½	1½	3	3½
2¼	0.53	0.57	0.45	0.46	1½	1½	3½	3½
2	0.56	0.62	0.48	0.51	1½	1½	3½	3½

proper method for gaging the wear of the teeth at the pitch line and also the thickness at the pitch line to which the teeth should be worn before discarding. One discard gage was arranged for railway helical gearing (long and short addendum) and the other for railway spur gearing (long and short addendum). Dimensions of the gages, which were given in the 1926 proceedings of the A.E.R.E.A., pages 510-511, are reproduced for the convenience of those who are not familiar with them. It is recommended that every shop be provided with a set of proper gages so that guesswork can be eliminated in the important matter of determining when a gear or pinion should be scrapped.

Superintendents of equipment and master mechanics should welcome the use of this gage. The practice of leaving to the judgment of inspectors the decision as to when a wornout gear or pinion should be removed is



As shown at left, pinions and shafts may be damaged by driving a wedge back of the pinion for removal. There are many satisfactory types of pinion pullers (shown at right) that can be used to advantage by electric railways



Many troubles will be prevented by keeping gear cases tight

No. 1. The mixture of dirt and gear grease in these cases came from holes and poor fittings

No. 2. Gear cases in a condition like this one cannot be expected to retain gear grease

No. 3. Worn gear cases can be patched satisfactorily by welding



unsatisfactory. The discard gage of the design shown can be used readily for tooth measurements on worn-out gears or pinions. Dimension *B* for the gage used with spur gearing is usually taken as two-thirds of the original thickness at the pitch line of a new gear and pinion. Thus for a diametrical pitch of 3 this would be two-thirds of 0.523, or 0.348 in. The dimension *A* or *a* for the depth is the correct addendum. This varies slightly with the number of teeth.

Several of the more modern tooth shapes depart from the B. & S. standard and have higher pressure angles. These include the long and short addendum tooth, the helical tooth and the wisdom tooth pinion. When cut these teeth are broader at the base and narrower at the top than the B. & S. standard, so that frequently they wear to a knife edge before they are worn sufficiently at the center of the tooth to warrant discarding. Such a condition is shown in the diagram illustrating the discard gages. After the gear or pinion is worn to a knife edge at the top it should be discarded regardless of the gage. The A.E.R.E.A. standard gages take their height bearing from the root of the tooth. The vertical legs are of such a length as to make the gage point bear at the center of the working depth and the inside slot of the gage is deep enough to provide a clearance over the top of the tooth. Where it is desired to check actual tooth dimensions the simplest and most accurate method is to get them from the gear manufacturer for each specific type of gear or pinion. If the standard gages are used a considerable number of pinions will be discarded that are now left in service; but with the discarding of the pinions there will also be discarded considerable trouble and high maintenance cost which comes as a by-product of gearing that is allowed to stay in service too long.

The best test of a good gear lubricant is to make an inspection frequently and see if the teeth are actually covered with an oil film. I have seen the lubricant so heavy that in cold weather it piled up on the outside of the gear like the waters of the Red Sea that allowed the children of Israel to pass over without even getting their feet wet. Gear life can be extended greatly with the right kind of lubricant if it is used often enough to keep the gear surfaces well covered at all times. Inspection should of course include the gear cases to make sure that the lubricant is not being lost.

Another source of trouble where the teeth are of proper shape and material and properly lubricated comes

from too great spacing between gear and pinion as the armature and motor axle bearings wear. In consequence the teeth, instead of touching at the pitch line, come in contact only at the outer ends with resulting greater wear and noise from backlash.

The wear which causes this spread condition of the gear and pinion may take place not only in the bore of the bearing but also on its outside and in the frame or housing where it is held. Some wear is possible also on the outside of the motor housing. With the worst conditions there is a great increase in noise especially as the car speed changes during a run. When a change in the car speed or reversal of direction causes the gearing to change from engaging on the front of the teeth to the back, or vice versa, there is a great deal of backlash to take up, and also danger that the teeth will break because the great impact is exerted on the small area.

The correct way of course to operate gearing is with the teeth meshing at the pitch line. To approximate this the tolerances for the fit of the bearing on its shaft should be minimized and all excessive wear eliminated.



It is false economy to wear teeth excessively

No. 1. How can correct gear action be expected when pinions are allowed to wear like this?

No. 2. Properly lubricated gearing has the lubricant adhering to the teeth

No. 3. Several teeth in this gear broke as a result of leaving it in service too long. The broken teeth damaged a good pinion

Attention to Details Is the Secret of Low Track Cost

To reduce paved track maintenance costs the design should be modernized, labor saving methods introduced and material handling equipment used wherever possible

By T. J. Lavan

General Manager International Steel Tie Company, Cleveland, Ohio



Labor saving and material handling equipment are used extensively in Kansas City

Above—Pneumatic concrete breakers cutting out old concrete paving base.

In oval—Pneumatic tampers working on concrete ballast under traffic



PARTICULARLY in the larger rehabilitation programs, track built in the last few years has been regarded as a business investment and track budgets for construction have come to be regarded as expenditures, the control and administration of which should be efficiently handled. During the adjustment period from 1918 until a few years ago the financial outlook justified no complete mechanical and departmental organization of track construction activities. This, because of lack of new capital, the slenderness of track construction funds and because only necessary stop-gap construction was being done with a doubtful future, checked the normal American tendency toward progress and efficient methods.

This lull for readjustment of the whole industry has been followed by the present comparatively optimistic outlook and the consequent release of the latent ingenuity and ability of the leaders of track construction thought in the United States. It is this hopeful indication of the trend, which a national viewpoint indicates, as well as the

increased budget estimates for track in the 1928 Statistical Number of the *ELECTRIC RAILWAY JOURNAL* which inspires this article. If it carries the message of better design, and improved and labor-saving installation methods to those who may not have been touched by the developments that are being rapidly made, its purpose will have been accomplished.

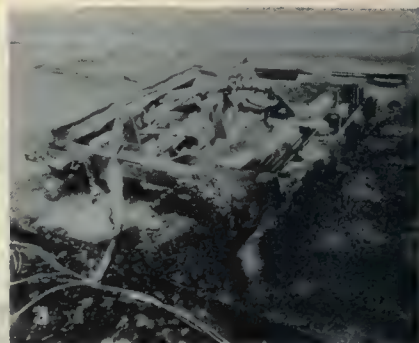
The outstanding trends in the design of paved track in the past season are toward permanently welded rail joints, A.E.R.E.A. standards in rail sections, the increasing use of lower rails, rail tilting, and the use of concrete ballast with the three well known types of steel ties on the market.

An analysis of the reports of paved track laid in 1927, given in the Statistical Number of *ELECTRIC RAILWAY*

Carefully worked out

Mechanical Methods

are used by the
Denver Tramways
for
handling concrete
materials



1. Flat car carrying batch dump cars backed up to end of the mixer
2. Dumping a batch into the mixer skip. The flat car carries eighteen of these batch cars
3. Electrically operated concrete pavement finishing machine
4. Concrete material elevator is used where batch cars are loaded
5. Tamping ties with Johnson electric tampers

JOURNAL, indicates that one type of welded joint is used in 60 to 70 per cent of the total track reported. The remarkable trend toward this joint is due in large measure to careful installation supervision by the manufacturer as well as to improvements in the design, methods of installation and improved quality of material. Too much emphasis cannot be laid on the value of field supervision in paved track construction.

The value of Association standards can only obtain full recognition by use, and the trend toward A.E.R.E.A. standard rail sections is encouraging to those whose efforts have provided the new designs. Association standards represent the best thought and a wide experience and they can be followed with assurance of their worth, if properly selected and correctly applied.

Along with the trend toward Association rails is the noticeable use of lower rail sections, usually 7 in. replacing 9 in. The appended table of rail sections, for which Twin Ties were furnished last year, as compared with rails used in 1926, indicates this trend.

Rapid acceptance of rail tilting marked 1927 track design for paved streets. The practice of tilting the rail inward so that the slope of the head corresponds to the coning of the wheel tread increases the area of contact between the rail and wheel and passes the resultant of the load through the rail, parallel with its vertical axis. The life of the rail is increased and pavement adjacent to the rail is relieved of the grinding action and transverse crushing force due to the tendency of a vertically placed rail to dip outward under load. Rail tilting has the approval of the American Railway Engineering Association's committee on track and, considering the well known conservatism of this body, it may well serve as a guide to electric railway engineers considering the tilting of their rails on paved work.

The increasing use of concrete ballast with the three well-known designs of steel ties on the market has come to the attention of all, but only to railway engineers using these track designs and others in close contact with this type of track is it apparent that here also, close field supervision and higher standards of materials and methods of installation have met early objections to steel tie construction.

Early designing in this field was frankly commercial, with wide spacing of ties, and a disregard of conditions such as subgrade and loadings which must guide every installation of track if the results are to be satisfactory. A general rule, by the logical method of design, is for the engineer to apply by comparison his local standards of bearing and drainage, or other subgrade treatment such as rolling, to all such installations and to superimpose these requirements on the manufacturers' maximum and minimum specifications of tie spacing and depth of concrete slab, respectively.

Most of the track which has been built in the last few years has been designed to eliminate to a considerable extent the necessity for maintenance work such as was needed on track built years ago. One of the principal elements in track maintenance is the failure of joints. While modern rail joints made by the welding processes are not immune to failure, there are so few failures that they are practically negligible. Unfortunately the most of the track in service is comparatively old, and the joints are the principal sources of trouble. The track is too good to be rebuilt and methods of repair are essential.

One of the worst practices is the temporary repair of rail joints in the anticipation that the track will fail com-

pletely in a few years. On many properties the same repair practices are being followed that were in use twenty years ago, although construction methods so far out of date would not be considered for new track.

The use of old methods is due to a false idea of economy. For instance, when bolted joints get loose and the wheels pound them out of shape, the common plan is to open up the paving, drive some shims or "cobhouse" blocking under the joint, tighten up the bolts and replace the paving. Sometimes where it is possible the ties are tamped and occasionally the joint plates are turned around or upside down and welded onto the rail. The idea seems to be that the plates are there and must be used. No one would think of using a plate that would not fit in connection with a new rail, and the necessity for using a plate that fits is even greater where the rail is worn.

In some of the larger cities it costs between \$50 and \$60 to open the paving sufficiently to do any kind of work on a joint and replace the paving in permanent form. If the repair itself is not of the right kind and well done it does not last for any time.

The false economy is in the failure to do the work right when the joint is opened, because the additional cost of the permanent repair over the temporary one is only \$4 to \$5 at most. In one particular instance the joints were opened up and repairs were made at the cost of about \$50 each. Within the last three or four years such repairs have been made on the average once a year. The cost of permanent repairs was considered too great, but had they been made the first time it was necessary to open the joints the subsequent openings would have been unnecessary. Assuming that the original cost of the repair had been increased \$10 per joint, making a total of \$60, the cost for the past four years would have been only \$15 per year. With the system of temporary repairs in vogue the annual cost has been \$50 per year. In justification the track engineer usually says that he hoped the repair would be permanent.

On the contrary, on some properties the plan of making permanent repairs has been adopted with excellent results. In two cities the writer has in mind the joints were giving considerable trouble. They were opened up, thermit welded and paved in again. Nothing more has been spent on them although these repairs were made many years ago.

No matter what process is used to repair the rail joint itself the correct plate should be purchased and fitted up, the ties should be tamped properly under the rail so that they support it as the original design called for, and shims and "cobhouse" blocking should be avoided entirely.

A form of so-called repair that has been tried is to build up the top of a cupped joint with the arc welder without going to the expense of opening up the joint. While arc welding is an excellent thing it cannot take the place of a proper repair. It does not tighten up the bolts and it does not put a support under the receiving rail, where it is needed with bolted joints. Where such careless practices are used the welding itself is likely to be careless. While in some companies the superintendents are very careful to instruct their operators, entirely too many of them put arc-welding equipment in the hands of a common laborer and expect him to get results. This attempt to do expert work by common labor, which at best can save only a few cents in the cost of a joint, is another false economy. The building up of rail joints or special work with an arc welder should be done carefully.



Tracks that formerly took twenty men with jacks to move are placed now with a 1-ton Fordson crane

Another source of difficulty in welding joints is the use of improper materials. Some superintendents attempt to use any kind of steel for welding in place of the correct welding rod. Many manufacturers are selling welding rods, and the tendency is to purchase the cheapest. There are welding rods on the market that have been tried and proved. The difference in cost of the best welding rod over the period of a year is picayune compared with the damage that can be done by the use of unsatisfactory rods whose merit has not been proved in connection with steel of the type in the rail.

The evil of these poor types of joint repairs does not end with the need to do them over again after a year or so. The rail ends are likely to be damaged beyond the possibility of further repair. When this happens it is necessary to cut the joint out entirely and put in a short piece of rail, making two joints instead of one, and necessitating further opening of the paving. These cut-in pieces are seldom satisfactory and the life of the entire track is endangered.

Another place where there is a good deal of false economy in track maintenance is in repairs to special work. When special work pieces get broken or when the hard centers get loose repairs can be made to a certain extent. Continual patching, or what is worse, patching on the patches, is exceedingly expensive. Sometimes where frogs or switches are broken they can be taken out of the street, taken to the shop and welded so that they will be made serviceable again for years. Here again a real repair pays where patching, shimming and similar practices simply waste the money.

PRODUCTION METHODS ADOPTED IN CONSTRUCTION

In the actual construction the development which is most impressive is in the adoption of mass production methods in the larger programs and their use with practical limitations by the smaller properties. The mechanization of track construction inspires the thought that modernizing methods will affect maintenance by reducing costs and improving quality of track. It is an axiom in mass production that any repetitive operation can be more accurately, uniformly, dependably and economically performed by machine than by hand labor. Use of machinery and handling equipment in paved track construction needs no theoretical justification, as a glance at the highway field will indicate. The ideal in the development of mechanical and production methods in track construction, *i.e.*, the displacement of all common labor by machinery, may never be attained. However, the possibilities are

predicted by modern highway construction technique where, in the opinion of road building engineers, the addition of one or two special machines would today make concrete road building completely mechanical.

Development of special track-laying machinery awaits only acceptance of the principles of mass production and their adoption to a greater or lesser extent as the size of the program, local conditions, and the amount of money in the construction budget may determine. A startling comparison with yesterday's methods is seen in a recital of already available labor saving equipment and track machinery which, without doubt, will find wider use next season than it has had in the past.

DRIVE NO SPIKES WITH A MAUL

The old familiar plan of driving spikes with a maul is taken as the first illustration because it is being replaced by the latest of the pneumatic track tools, the spike driver. On one steam road, in spiking 39 ft. rails with 26 ties to the rail length the time required with two spike drivers was one minute and 30 seconds per rail as compared to ten minutes per rail length with a four-man gang, spiking by hand. Pneumatic or electric hand tools, while accepted on the many large city properties, have still to find their way into general use on the smaller ones. Yet the savings possible justify their use even on the smallest jobs. Among this class of tools may be mentioned pneumatic and electric track drills, screw spike and joint bolt wrenches, concrete breakers, wire brush cleaners, scaling tools and portable saws. But most important with such tools is their consistent use with standard rules issued to foremen requiring their use on all work with definite performance tasks set.

TAMP NO BALLAST BY HAND

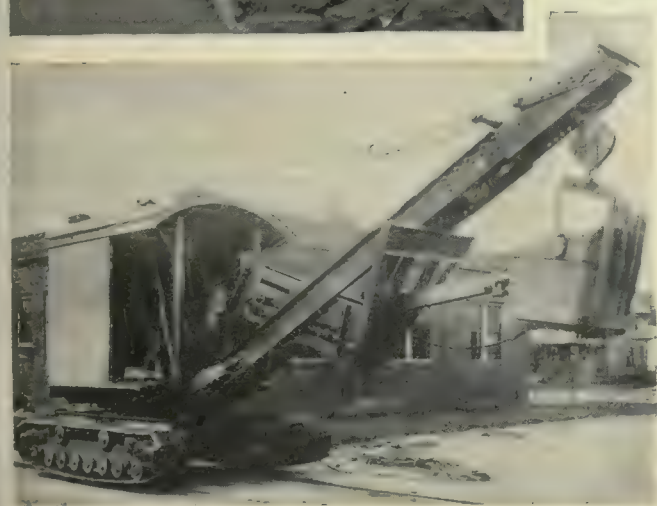
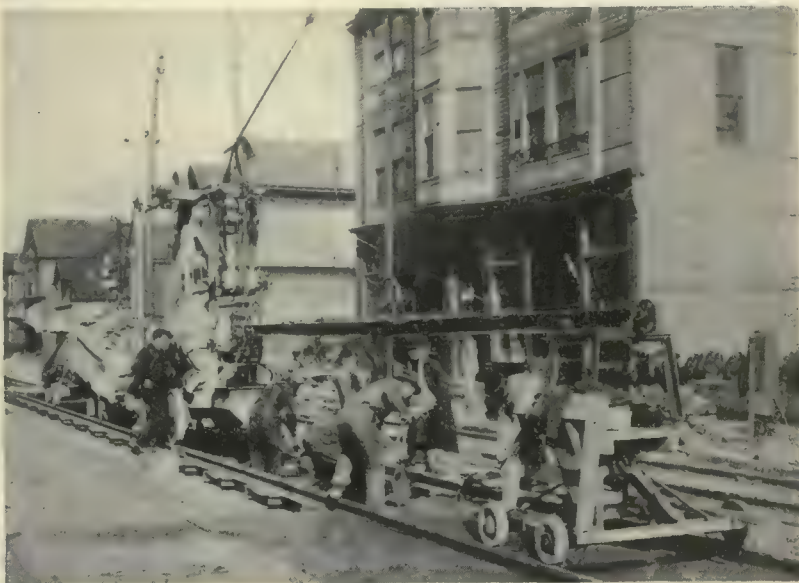
An attractive field for labor saving is in tamping ballast, but a consideration which far outshadows labor cost in building paved track is the elimination of the human element and the assurance of a thorough and uniform contact of the ballast with the bearing surfaces of the ties and filling in all pockets and voids.

The use of pneumatic and electric tampers is so general that it may seem unnecessary to point out their advantages for tamping stone ballast in paved streets; yet it is notable that on many properties the hand pick and

COMPARISON OF THE COSTS OF MACHINE TAMPING VERSUS HAND TAMPING

Based upon the performance of these machines for several months, working exclusively in stone ballast. The cost is given in "tie parts," assuming four parts per tie, one inside and one outside each rail, and the expression "single" or "double" tamping refers to the tamping of a "part" on one side or on both sides of the tie.

Machine Tamping—One four-tool portable compressor outfit.	
Interest on investment, per day, at 6 per cent.	\$0.57
Depreciation on basis of 5-year life, per day, at 6 per cent.	1.61
Repairs (from a 5 months' record), per day.	.94
Gasoline, 2½ gal. per hour for 6½ hours at 27 cents.	4.39
Oil, one quart, at 50 cents per gallon.	.12
Wages, five men at 40 cents per hour, for eight hours.	16.00
	\$23.63
Number of tie parts double tamped per day.	612
Cost per double part tamped.	\$0.038
Machine Tamping—Four tamping tools without compressor outfit—air taken from existing air line, for which no charge is made.	
Interest on investment per day, at 6 per cent.	\$0.08
Depreciation on basis of two year life, per day, at 6 per cent.	.61
Repairs, estimated.	.25
Wages, five men at 40 cents per hour, for eight-hour day.	16.00
	\$16.94
Number of tie parts doubled tamped per day.	612
Cost per double part tamped.	\$0.027
Hand Tamping—With picks, on a five-man basis.	
Depreciation and repairs, estimated, per day.	\$0.25
Wages, five men at 40 cents per hour, for eight-hour day.	16.00
	\$16.25
Number of tie parts single tamped per day.	320
Cost per single part tamped.	\$0.050



The Cleveland Railway has been particularly active in the use of labor-saving equipment in track construction

At top, left—The paving plow in operation on one of Cleveland's streets.

Top, right—An electrically driven concrete mixer with extension boom and traveling dump bucket is used for concreting tracks.

Lower, left—An electric shovel with combination caterpillar tractor and car wheel truck is found convenient.

tamping bar are in every-day use. The savings possible make the equipment an excellent investment. The example of comparative costs given on page 450 is representative.

For concrete ballast the new principle of compression tamping completely mechanizes this operation, at the same time improving the result. The latest machine for compression tamping is driven by a 550-volt motor. It can be connected directly to the trolley circuit and is operated by one man. The theoretical production capacity of the machine is 3,000 single track feet per day, which is ample for the usual concrete mixer, which will control the production speed on work which follows.

A new principle in track construction is involved in compression tamping. While theoretically concrete is a fluid, it is well known that even after thorough mixing it contains air and water pockets and is capable of considerable reduction in volume as produced during the tamping and puddling process. Moreover, this principle avoids mere puddling of the mix, which has a tendency to cause a settlement of the heavy aggregate. The 300 to 500 lb. of compressive force applied by compression tamping, forces the concrete, without disturbing the relative position of the aggregate, into complete and full contact with the tie bearing surfaces.

The labor saving obtained is equal to three man-hours times the number of hours in the working day, for each day's production.

One of the most obvious labor leaks in usual methods of construction is in the moving of ballast materials by hand on the track, either into the track trench or into concrete mixer skip. That savings result by using material handling equipment hardly needs supporting data and, therefore, merely examples of advanced practice are indicated as obviously saving large sums in man-hours of time.

One carefully planned mechanical method is used by the Denver Tramway Corporation on concrete. In the material yards, mechanical conveyors and elevators take material from pits under hopper-bottom gondola freight cars to elevated storage, where it is dropped directly into narrow-gage batch cars of the end-dump type, eighteen of which are carried on a flat car of Denver's standard gage. The flat car floor has three narrow gage tracks and switches, leading to a stub single track at the end of the flat car on which the batch car is in dumping position, over the skip of the mixer. Thus all materials come to the mixer ready batched, with only three men's time chargeable against the handling operation.

A variation of this method is the use of Differential dump cars in getting the material out to the street where it is handled by Haiss batch-bin type elevating loaders and light dump-body trucks direct to the mixer skip. This development was used on Kansas City work in 1927. Commenting on it A. E. Harvey says, "The inclosed statement shows the difference between cost of placing concrete with our mixers which are loaded by hand and wheel barrows at a cost of \$2.67 per cubic yard as compared with \$1.29 where a 21-E mixer is used and is charged by trucks which are in turn loaded with a Haiss loader. Thus you will note, that the use of the loaders and large mixer makes a saving in labor of 51 per cent."

The detail figures in Mr. Harvey's comparison are given in the accompanying table.

Some practices common in trackwork not only waste time but are apt to cause personal injury. One of these

COMPARATIVE COSTS OF PLACING CONCRETE IN KANSAS CITY
USING OLD AND NEW METHODS

	Cu.Yd. per Linear Foot, Single Track	Cost of Placing Single Track Per Foot	Per Cu.Yd.
Concreting with old method, using one mixer on base course and one on top course, loading both mixers with hand labor on first half double track.	0.277	\$0.74	\$2.67
Concreting with 21-E Rex paver on base and top courses, using one Haise loader on rock and one on sand, loading into Ford trucks and hauling to mixer. Cement was thrown on top of batch truck when truck passed cement car, on second half double track.	0.426	0.55	1.29

Note:—No finishing or curing is included in above costs since they would be the same with either method.

Common labor was paid at the rate of 30 cents per hour and trucks \$1 per hour.

Average concreted per day with old method, 406 ft. S. T. or 112 cu.yd.

Average concreted per day with new method, 570 ft. S. T. or 243 cu.yd.

All variations of the above methods attempt to replace the shovel and wheelbarrow as completely as possible in handling ballast and concrete materials on the street.

is the handling of rail from the curb or the trench side into the trench by means of tongs. Safety alone dictates the use of a mechanical method for handling rail, but in addition large labor savings are possible on extensive work. Mechanical handling permits the setting of the rail in close alignment and approximately to surface, reducing the subsequent labor. Both simple and elaborate crane equipments are available. A recent adaptation, the Fordson tractor illustrated, offers the advantages of mechanical handling at a cost well within the limits of small property budgets.

Removal of old track and excavation for new construction offer similar opportunities for saving labor. Many improved devices have shown startling economies as compared with hand work. For instance, the concrete breaker was used on old 6-in. thick concrete paving foundation. For one-half the devil strip, between the rails of standard gage track and 1 ft. outside the rail, the machine broke 45.8 single-track feet per man-hour. Hand methods with picks, shovels, chisels and sledges broke the concrete at the rate of 3.48 single-track feet per man-hour.

With the special plow illustrated, which is drawn by a motor car, the removal of granite block was 113.23 ft. per man-hour, while by hand, using bars, the equivalent removal was 2.12 ft. per man-hour. It is unnecessary to give more examples to prove the saving of mechanization of construction. The following example from Kansas City shows the comparative costs of excavation by hand and by machine:

COMPARATIVE COSTS OF EXCAVATION, KANSAS CITY

	Cu.Yd. per Linear Foot, Single Track	Cost of Placing Single Track Per Foot	Per Cu.Yd.
Excavating by hand, first half of double track.	0.365	\$0.82	\$2.25
Excavating with Inslay, second half of double track.	0.365	.66	1.81

Note:—No dismantling is included in excavating cost since this would be the same using either method. Common labor was at the rate of 30 cents per hour.

	Feet of Single Track	Cu.Yd.
Average excavated per day:		
By hand.	565	206
With Inslay.	632	231

The fundamental principle involved may be stated as follows: Human energy can be profitably employed only for the control and guidance of power, never for its supply.

A corollary of this in the construction of paved track is that the power used should as far as possible be drawn from the overhead, that is, electric shovels and electrically driven tools of all kinds should have preference over those of gas or steam. Even on small properties and for short lengths of paved track work the rental of this type of equipment will make a net saving on the removal of old track item.

TYPE AND HEIGHT OF RAIL USED ON STEEL TWIN TIE
INSTALLATIONS IN 1926 AND 1927

Section Number and Weight	Height, Inches	Type	1926	1927
56-lb. relayer.	6	T	x	x
60-lb. Lorain steel 263.	4 1/2	T	x	x
60-lb. A.S.C.E.	4 1/2	T	x	x
60-lb. A.R.A.-A.	4 1/2	T	x	x
70-lb. A.S.C.E.	6	T	x	x
72-331 Lorain Steel.	6	T	x	x
73-274 Pennsylvania Steel.	6	T	x	x
73-274 Bethlehem Steel.	6	T	x	x
75-lb. A.S.C.E.	4 1/2	T	x	x
80-lb. A.S.C.E.	5	T	x	x
80-lb. A.R.A.-A.	5 1/2	T	x	x
80-220 Pennsylvania Steel.	5 1/2	T	x	x
80-335 Lorain Steel.	7	T	x	x
82-505 Lorain Steel.	7	T	x	x
85-lb. A.S.C.E.	5 1/2	T	x	x
87-381 Lorain Steel.	6 1/2	Girder	x	x
90-lb. A.S.C.E.	5 1/2	T	x	x
91-282 Bethlehem Steel.	7	T	x	x
93-507 Lorain Steel.	7	T	x	x
95-400 Lorain Steel.	7	T	x	x
96-357 Lorain Steel.	7	Girder	x	x
100-lb. A.E.R.E.A.	6	T	x	x
100-lb. A.R.A.-A.	6	T	x	x
100-lb. A.S.C.E.	5 1/2	T	x	x
102-516 Lorain Steel.	7 1/2	T	x	x
103-478 Lorain Steel.	7	Girder	x	x
104-396 Lorain Steel.	8	Girder	x	x
105-lb. Carnegie 10524.	6	T	x	x
114-480 Lorain Steel (guard).	7	Girder	x	x
115-462 Lorain Steel.	7	Girder	x	x
122-407-A Bethlehem Steel.	7	Girder	x	x
127-397 Lorain Steel (guard).	7	Girder	x	x
128-404 Bethlehem Steel.	7	Girder	x	x
134-406 Bethlehem Steel.	9	Girder	x	x
140-468 Lorain Steel (guard).	7	Girder	x	x
141-395 Lorain Steel.	9	Girder	x	x
147-95 Maryland.	5 1/2	T	x	x

x—indicates year used.

A notable development of the past season is the general adoption of field control methods for developing the maximum strength of concrete mixtures. Average compressive strengths as high as 3,000 lb. on all concrete placed in the track structure are being obtained in many instances, amounting to an increase of as much as 30 per cent over former results on the same properties.

Such tests include the sieve test for the size and grading of the aggregates; the simple water test for soluble matter in gravel; the slump test for checking the water content and test cylinders for data to serve as a check and control of the quality of materials used and the strength of the concrete and to regulate the time of putting the finished track in service.

A valuable and simple addition to all concrete mixers is a timer for checking the mixing time. Where used, a specification is given for period of mixing, which should be rigidly adhered to. Often this may save time and increase the daily production of concrete. In this way the rapid increase in strength and uniformity of concrete for mixing periods up to two minutes can be taken advantage of on the work.

A development of the past few seasons which is worthy of note is the practice of detaching the inspection department entirely from construction. With this type of organization complete specifications are written on all the track and the inspection department reports directly to an operating vice-president or other executive above the construction department. It results in close adherence in the field to both material and method specifications. It has been suggested the latter might be amplified to include performance or production requirements.

The observations which are presented in the foregoing are in no way intended to be inclusive of all that might be done to improve paved track construction and so reduce the maintenance of such track in the future, but they take their strength as valuable innovations in track practice from the fact that they indicate modern trends and support the proposition that to reduce maintenance the logical place to start is to modernize design and methods of construction.

A Good Lubricant can be Ruined by Improper Handling

Exterior of oil storage house at the Coney Island shops of the Brooklyn-Manhattan Transit System. Note fireproof construction, unloading platform at level of car or truck floor, and windows for lighting



By Allen F. Brewer

Mechanical Engineer The Texas Company,
New York, N. Y.

DEVELOPMENT of the storage and handling of lubricants has been most interesting. Once oil storage was regarded as relatively unimportant. Usually the darkest, dirtiest corner in the electric railway shop or storehouse was deemed good enough. In fact, there has ever been an association of grease with dirt. Note the common usage of the term "greasy." Yet modern street railway lubricants are among the most highly refined of oil products from the viewpoint of actual purity and freedom from dirt. If they ultimately show contamination, storage and handling practices should be investigated. It is better, however, to make such an investigation a matter of insurance against contamination, rather than a means of correction after it has occurred. Rolling stock and power plant equipment will be protected more completely thereby, for effective lubrication can more nearly be accomplished and maintained.

After receipt the responsibility of the consumer com-

mences. Any lubricant is only as good as the care it is given in storage and handling. Regardless of how carefully any lubricant may be refined or selected, precaution must be taken to preserve its purity prior to use. Just because a compressor oil is obtainable with practically no water or foreign matter content, is no assurance of its ultimately giving satisfactory service if, for example, the shipping container has been handled roughly, allowed to remain exposed to the weather, or stored so that foreign matter can gain entry. This is true especially of wood barrels, where cracking or warping of the staves or heads through weathering or careless handling, will in all probability cause particles of glue to be chipped loose, or reaction brought about between the glue lining and moisture due to entry of the latter through cracks, which finally will get foreign matter into the oil and reduce its value as a lubricant.

Storage and handling of lubricants in the average

Oil Handling Practices That Should Be Eliminated

AVOID improper location of the oil house. Much time and energy will be saved by locating the oil house centrally.

When underground tanks are installed don't forget that an adequate foundation will save much trouble.

Much annoyance will be avoided by seeing that all pipe joints are made up tight.

Neglect of fireproof provisions may prove very costly.

Dirt and refuse are enemies to lubrication storage. Don't employ careless attendants.

Don't allow oil to drip.

The "help yourself" habit will not work out

satisfactorily with any well-organized system for keeping records of lubrication.

Water will contaminate a lubricant as well as dust and dirt. Keep all tanks or containers covered to prevent entry.

Don't forget that full barrels or drums are heavy. Use two men to handle where necessary.

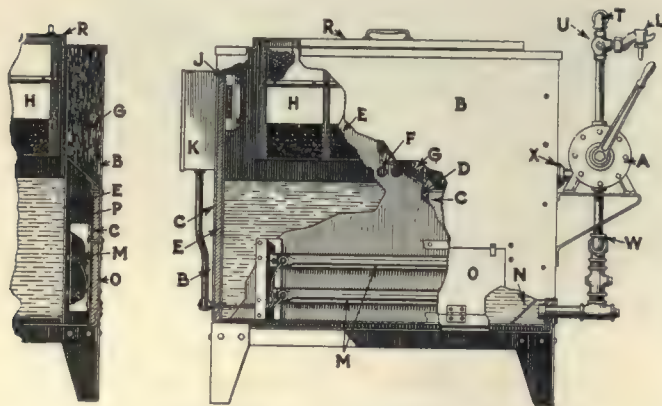
Be sure that any accumulation of oily waste is not permitted. Rags or sawdust have no place in an oil house.

Don't forget to keep grease drums covered.

The boring of holes in wood barrels or the reaming out of existing holes should not be permitted.

electric railway system involves certain distinct factors which include:

1. Design and construction of the storage facilities.
2. Type, size and arrangement of equipment, such as pumps, heating coils and gages.
3. Handling equipment available for moving or lifting products and shipping containers.
4. Provisions for measuring oils and keeping suitable records.



Sectional view of a waste-soaking outfit

- | | | |
|-------------------------------|---|---|
| A. Pump | H. Waste containers with screen bottoms | P. Heating chamber |
| B. Outer tank | J. Thermostat | R. Hinged cover |
| C. Asbestos insulation | K. Magnetic switch | T. Hose connection |
| D. Metal lining over asbestos | L. Draw-off nozzle | U. Three-way cock |
| E. Inner tank | M. Heating elements | W. Hose connection for draining barrels |
| F. Hot air ports | N. Strainer | X. Overflow pipe |
| G. Mineral wool insulation | O. Hinged door | |



A combination skid and barrel draining device. This is very handy for emptying the contents of drums or barrels into underground or basement tanks, in a clean and economical manner



Where oil storage tanks must be located in the main store house, the oil room should be partitioned off from the other part as shown here. Only those employees who have to do with the handling of lubricants in storage should have access to the oil room. Other store house personnel should be kept out

5. Methods of distribution to the various units, departments or shops.

6. Management of the storehouse.

The primary requisite for any road using a considerable volume of lubricants is a central storage house, or at least a special room from which lubricating oils and greases can be issued in suitable quantities as needed. Whether or not any road will be justified in going to the expense of constructing an independent oil house will depend to a great extent on its size and the amount of equipment.

There will be considerable expense attached to such an installation. Many roads adjacent to oil supply depots set aside a corner of the main storehouse for lubricants, and keep them in the shipping containers. There is an objection to such oil room storage, in that there is considerable possibility of contamination. Dirt sometimes will be swept into the drip pans and measures. There will also be considerable chance for leakage and wasting of oils unless an unusually careful employee has complete charge and keeps the room locked and inaccessible to all others.

Wherever a detached oil house is warranted or an oil room is set aside, it should be fireproofed with brick, tile or concrete walls and floor, and a tile, metal or slate roof or ceiling laid on steel beams or rafters. The floor should be fitted with drains.

Only recently a railway was inspected which prided itself on its oil storage facilities. An oil room had been laid out, measuring pumps with drains installed, the tanks located below grade, regular lubricating accounts kept and all employees educated in proper lubrication. But, below the main floor there was a basement with a dirt floor, and it was covered with several inches of oil, mud and shavings. In one corner were the storage tanks, in another a heterogeneous mass of broken barrels and junk. Nor was there any provision for heating. This might be considered a good example of how oils should not be stored. There must have been oil leaks, else how came the oil on the floor? Without doubt the tanks ultimately would suffer for water and mud are corrosive.

Light is important. Normally, there should be as few doors and windows as possible commensurate with the amount of light required, and those should be of the steel frame or roller type, fitted with wire glass and automatic closing devices.

The location of the oil house is important. An appreciable time will always be lost in handling heavy lubricant containers and there is possibility of damage both to lubricants and containers if the latter are rolled or tumbled about unnecessarily. When possible the oil room or house should be as close as possible to the railroad siding, dock or street. Thus the containers will be subject to the least possible handling.

Where oil or grease drums or barrels are to be handled from one level to another, hoisting is involved. Hoisting is not only expensive, but entails severe handling. Wood barrels especially will suffer, and warped and cracked heads, sprung seams, or the jarring loose of particles of the glue lining, often will occur. Any damage to the container which may break the seal and lead to entry of water or foreign substances, is serious.

"One-level" handling is best. The platform of the oil house or storage room should be on a level with the car or truck floors. Then the containers can be rolled, trundled on hand trucks, or handled by a portable con-

veyor, directly to the filling hatch of the storage tanks or to the hoisting device above the tanks.

As a rule it will be practicable to build an oil house with a basement for the bulk storage tanks. The main floor in such a house would serve as the receiving and delivering room. In many such installations all tankage is kept below the floor level, this area being reserved entirely for delivery pumps and office space.

If but small quantities of certain products are to be stored for any length of time, it will save space and expense to keep them in the shipping containers rather than to transfer them to tanks. For car oils or other bulk lubricants permanent tankage is best.

Lubricants can be delivered to the shop or barn either in bulk, by tank car or boat, or in steel drums, barrels or cans. With bulk delivery, the location of the tanks with respect to the delivery level is naturally important. Usually under such conditions the lubricant is transferred from the tank car or boat through a hose connection. The same hose should never be used for delivery of black oils and lighter lubricants.

Gravity flow is quickest and cheapest. It is necessary to locate tank filling hatches below the level of the outlet valve of a tank car. With boat delivery, pumping generally is necessary. Gravity delivery will also facilitate handling package shipments in drums, barrels, or cans.

When pumping is necessary care must be taken in the location and operation of valves. With a number of tanks there will be a possibility of drawing some inferior grade of oil into the suction line to contaminate a more highly refined product.

Most effective handling of lubricants requires control of oil house and tank temperatures. Where possible basement or sub-surface location for an entire tank or at least the major part of it is desirable as it will not be subjected to as wide variations in temperature, if the building is of relatively solid construction. Frequently the basement can be closed sufficiently for temperature control by sealed trapdoors, and the entire room kept at the requisite temperature for pumping the heavier lubricants.

Wide temperature fluctuations may lead to sweating and condensation of moisture within the tanks. Compressor oils and the like can be seriously contaminated in this manner. Yet, retention of heat within the tanks is necessary. It would be folly to spend money on tanks, pumps and other expensive equipment, and set the tanks in a semi-covered basement or exposed to the weather.

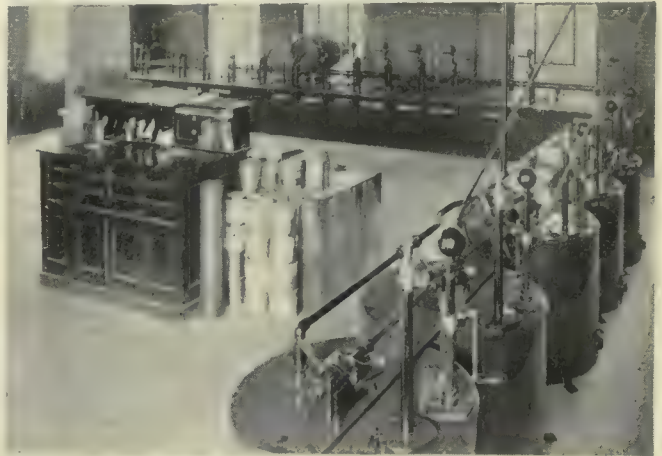
In the winter the temperature may drop below the pour test of car oils so they will become too sluggish for the pumps to handle properly. Too often this is the basis of complaint that the oil is too heavy. When heavy, viscous products such as gear lubricants, greases, and compounds are to be stored steam heating coils should be installed in the storage room or surrounding the tanks where temperatures may vary over a wide range. This will permit accurate regulation of temperatures, and overheating will not be so apt to damage certain products. Heating by exhaust steam is most economical.

Accessory equipment such as pumps, meters or other measuring devices and portable elevators for hoisting or lowering barrels, and so on, are always advantageous. Sealed pumps should be used wherever practicable for delivering fluids from storage tanks. Often such pumps measure automatically the amount withdrawn, which facilitates keeping records and checking oil consumption. Considerable time and labor can be saved and the attend-

ants can fill orders promptly. It also insures that the oils are kept free from contamination. Records of daily, weekly and monthly lubricant consumption should never be under-estimated. The effect on the morale and the economies in consumption of lubricants, will be surprising where employees must follow a definite procedure in the obtaining of their necessary supplies.

When barrels or drums must be hoisted frequently to the top of storage tanks or to emptying racks a portable elevator should be installed. This will facilitate handling and reduce the probability of damage, for a dead weight of from 400 to 500 lb. will tax the strength of two average men. A suitable track along the tops of tanks which are to be filled from barrels or drums is excellent. If this is at a sufficient height to facilitate location of the bungs over the filling hatches, there will be little chance for waste.

On certain roads the distribution of lubricants from the oil house or oil room involves a loss of time. On the other hand, effective distribution will tend to prevent contamination. The manner of distribution will depend on the location and number of units served. Where there are a number of shops or departments it may be most economical to deliver by motor truck, covering perhaps the entire yard at one trip. Otherwise hand truck



Oil storage tanks can be arranged in an oil house to leave space for storage of package lubricants and the office desk



Interior of an oil house showing a battery of first floor tanks with quart measuring pumps. Note barrel hoist and track extending along tops of tanks to facilitate draining and insure cleanliness. Also note provisions for side wall heating

delivery will serve the purpose. With car oils it will often be found advisable to supply the rolling stock departments with approximately 50 gal. at a time.

Cabinet type storage tanks, each with a hinged cover, are suitable for car oils. Such tanks are usually fitted with measuring pumps, and built so that any drip drains right back into the tank.

Storage racks for barrels and drums should be built of



A dirt-proof method of handling lubricants from barrels directly to lubricating equipment. This is adaptable to gear lubricants, which are to be subsequently applied by a high pressure compressor as shown. Each turn of the crank measures one pound of lubricant

steel, and so that individual containers may be removed quickly and independently. Good practice is always to store even the cheaper lubricants in the oil house to keep them warm. They should always be stored on the side with the bung down. It is usually inadvisable, however, to use wood barrels for lengthy storage of lubricating oils, on account of the possibility of contamination or loss from leakage.

Wood barrels have an appreciable salvage value, and in good condition they are returnable to the oil distributors, so care should be taken to prevent damage.

Holes should never be bored in the heads nor a bung-hole reamed out, nor should a bung be driven entirely into a barrel. Bungs should be removed by tapping the bung stave lightly with a wooden mallet or bung starter and then using a chisel or bung pick.

Wood barrels, when empty, are subject to warping of the staves and heads if stored on end or exposed to the weather especially if water is allowed to collect on the heads, or if they are exposed alternately to the sun and excessive dampness.

Gear lubricants and greases in general cannot be pumped readily at normal oil house temperatures. Perhaps the most extensively used semi-solid product in electric railway service is the straight mineral gear lubricant of comparatively high viscosity. Normally such a product is extremely durable and lends itself readily to bulk storage, and sufficient heating to permit pumping.

With greases, that is, products composed of a mineral oil and soap, the amounts on reserve should be held to a minimum. Certain greases may separate and revert to

the original components, especially when not refined carefully. Separation can be identified by observing that oil tends to collect in depressions in the grease when allowed to stand for any length of time. Heating of certain greases may also promote separation.

In any grease, the lubricating constituent is the oil content. The soap serves chiefly as the carrier. The best grease is that with the most homogeneous mixture. If oil separates from the soap it is logical to expect that effective lubrication cannot be assured. Grease, therefore, should be bought in such quantities that it always is as fresh as possible, and the shipping containers should be stored under a temperature as uniform as possible.

With manual handling care must be observed to protect all such lubricants against contamination. A clean spoon or paddle should be used, and only sufficient lubricant taken for immediate needs. It is easy for the foreman to estimate the quantity that should be issued.

Except when in use, the grease containers should be kept tightly covered. For wooden grease barrels, a sheet metal top will be found advantageous; it can be cleaned readily and kept in proper shape.

In the storage, handling and usage of lubricants best results will be obtained by putting the entire matter under the supervision of the master mechanic, shop fore-



Time may be lost while waiting for an oil can to fill. Overflow under such conditions will of course, be probable, and when it does occur, the floor will become sloppy and the fire hazard increased

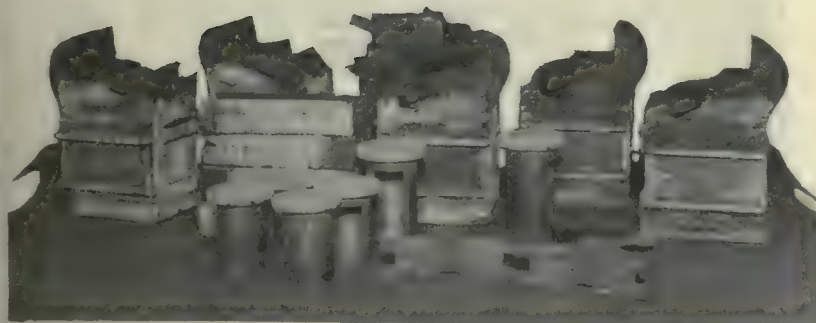
man or a capable lubricating engineer. There is a decided advantage in having a lubricating engineer, especially if his experience combines practical operation and maintenance and familiarity with the methods of refinement and the characteristics of the various lubricants. Not only should he reduce waste and keep down lost time, but he can keep proper records, develop specifications, purchase lubricants and test them. Whoever has charge of lubricants should see that products are delivered promptly, maximum cleanliness is maintained, and accurate records kept. Lubricants should be issued only on requisition or order. Excessive quantities should never be issued. Return of unused oils or greases is risky, for contamination may have occurred, especially if the workers are careless or if open containers are used.

Acetylene Welding Cuts Maintenance Corners

The process aids in maintaining the entire system from track to trolley and from power plant to shop. Repairs are speeded and large stocks of repair parts are made unnecessary

By W. I. Gaston

The Linde Air Products Company, New York, N. Y.



Armature bearings, worn sections of brakeshoe heads and the pedestal guides on journal boxes form an economical field for building up with bronze by acetylene welding



A revolving table used in welding display card holders facilitates the work

METHODS for maintenance must be chosen carefully in order to secure maximum economy in the operation of an electric railway system, large or small. Each problem that arises in connection with any part of the system probably has one answer that is the best, most efficient and most economical. That solution often may be some form of the oxy-acetylene process of welding and cutting.

In repairing track joints, use of a cutting blowpipe saves time. Rails can be cut and rusty track bolts removed in a fraction of the time required with a saw or chisel. For such jobs as cutting up old rails and laying them as guard rails, acetylene cutting is speedier, and therefore cheaper, than any other method.

For welding the bond terminals to the rails to obtain electrical connections that will permanently retain their high conductivity, no other method has given such satisfactory results as welding. The explanation is simple—other joints are at best contact joints, while the welded joint is a fused connection.

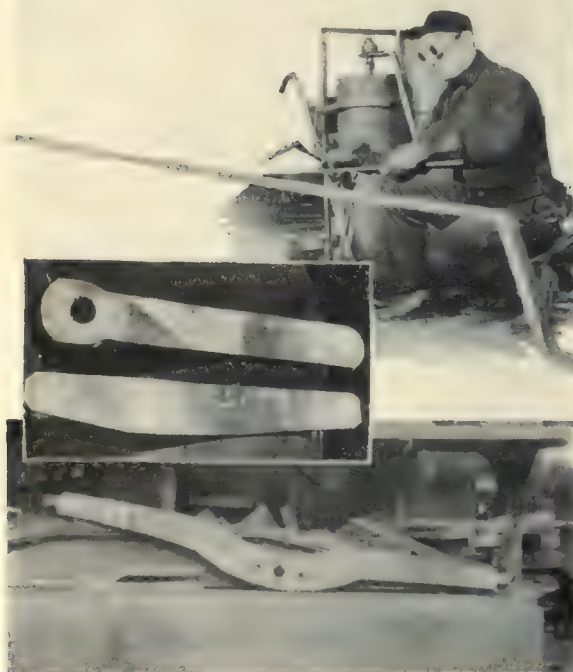
For rapid and thorough overhauling of cars it is necessary either to have a complete stock of replacement parts on hand or to recondition old parts efficiently. When a part is removed from a car it is replaced immediately by one from the stockroom and the worn or damaged part can be repaired and returned to stock for use on the next job. Of course, parts that are not interchangeable or not available are repaired while overhauling is in progress. A great many metal fittings, such as seat frames and supports, find their way to the welding department for repair.

On some large systems trucks are taken apart by cutting all bolts and rivets with the blowpipe. Cutting of bolts might seem unnecessary, but it is a great time saver since most of the nuts are rusted tight and many of the threads would be stripped if a wrench were used. Much hard labor is avoided by the use of the cutting



Acetylene cutting saves time in removal of rivets and bolts with nuts rusted tight in connection with dismantling of truck parts for overhauling

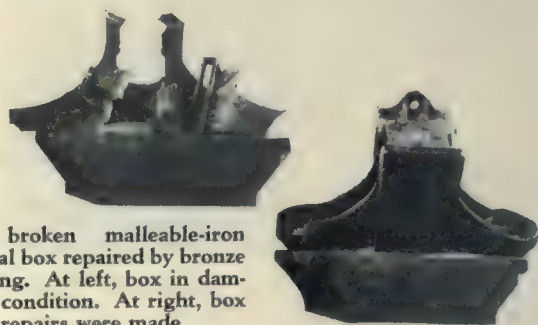
Some Cutting and Welding Work Where Maintenance Costs Are Reduced



Worn parts of brake levers are built up and worn holes are filled in for redrilling. At top, building up a long lever. In center, a brake lever with holes filled in for redrilling. At bottom, worn section of brake lever filled in



Acetylene cutting and welding save time in removal of damaged parts and in replacement of steel car body work. At left, heating a part of a bumper for straightening. At right, overhauling a body frame



Badly broken malleable-iron journal box repaired by bronze welding. At left, box in damaged condition. At right, box after repairs were made



Many large castings are cut out and welded in electric railway maintenance. At left, repairing a damaged compressor casting. In center, repairing a damaged motor sill. At right, worn coupler heads built up

blowpipe. As each part is removed from the truck it is carefully inspected for breakage or wear. If defective in any way, the part is sent to the welding department for reclamation.

The oxy-acetylene blowpipe is used for heating in the repair of side sills and bumpers. When a sill is bent, it would cost a great deal of time and money to remove the whole plate (possibly destroying the bolt threads in doing so), then to carry the sill to a forge, heat and straighten it, put it back and repaint it. It is much easier to wheel a portable welding outfit to the car, heat the bent sill while in place, and force it back to shape with clamps or a sledge. Many bent or cracked bumpers also can be repaired in place. Welding will save a bumper from the scrap pile even if it is broken in two.

No parts under the car are subject to more wear than the brake mechanism. All levers, rods and beams must not only be connected, but they must also be supported with pins or bolts. Since everything must have a run-



Welding a bond to a section of rail

ning fit it is easy to see that constant use wears the pins and elongates the holes. Levers, rods, beams and hangers are frequently worn at certain spots from continually rubbing against some other parts of the under-car structure. New pins are used to replace the old ones, but money and time are saved by filling in all elongated holes by welding and then redrilling them to correct diameter.

In some types of braking mechanism a radius or circle bar transmits the force from the pull rod to the truck brake levers. As the brakeshoes and pin holes wear, the radius bar is pulled over toward the pony or idler wheels of the truck, often so far that the flanges rub and wear it almost through. This is another building-up job for the welders. Many of these radius bars are salvaged together with the other levers, rods, beams and hangers.

Repairing air compressor frames is another function of the welding department. Sometimes the side itself is broken, but more often a bearing lug has snapped off. If there is a hole in the frame a piece of plate is cut to fit, the edges of both frame and plate are chamfered, and the plate bronze-welded in. Then the weld is tested with kerosene to make sure it is absolutely tight. Or if a broken bearing lug has brought the shell to the welding shop, the piece is welded back on again. When the lug has been lost, a new piece is worked up from steel by the blacksmith and welded in place.

The dismantling of the truck continues while repairs are being made on the braking system. The motor sus-



Ratchet castings for supporting shoe beams are reclaimed by welding

pension system makes use of steel bars and yokes and, as in the brake mechanism, holes that have become elongated are filled in for redrilling. Sometimes the vibration of a car throws a gearcase out of line and the gear chews a hole in it. The malleable-iron casting is then sent to the welding shop. A steel plate large enough to cover the hole is cut and bronze-welded over it. This is the simplest and probably the most satisfactory method of making this repair.

When rivets have been loosened by vibration, rivet holes in the side and end frames of the truck become worn. The same thing happens to the holes in gusset plates. All receive similar treatment; they are filled in by welding and then redrilled. Sometimes truck side frames break at the pedestal. It is common practice to repair them by carefully chamfering and welding the break. Then a piece of bar is forged to fit over the top of the pedestal. When it is approximately in place, it is heated with the welding blowpipe and clinched down tight on both sides. In forging the bar, the edges of the face that fit against the side frame are beveled, so that when the bar is in place there is a groove along its joint with the frame. This is used as a V and the point welded. The frame, because of the reinforcement, is then stronger than it was originally.

When it is necessary to scrap a car wheel the axle is often worth salvaging. Sometimes, however, the wheel is shrunk on so tightly that it cannot be removed in the wheel press. Such wheels are cut off with the blowpipe. Starting at the flange the cut is worked inward toward the axle until it is possible to crack the wheel with a sledge blow.

Brush-holders pivot on pins and have springs to keep the brushes in contact with the commutators. The holes in the brush-holders,



Worn and broken parts of seat castings can be easily reclaimed



Building up worn section of track at a switch

which are brass castings, become elongated. They are easily filled up with metal from bronze welding rod and then redrilled.

In a trolley base strong springs keep the wheel against the wire. The pole oscillates continually, causing wear on the fulcrum of the trolley stand. This makes it necessary to fill in and redrill the holes through which the fulcrum pin passes. The cast-iron lugs by which the controller is bolted to the platform are often broken off and must be replaced by welding.

In subway, elevated and interurban railway maintenance many opportunities for welding similar to those already mentioned present themselves, but there are others due to the different construction of cars and trucks. Long trains have hundreds of parts not required by the single surface car, such as draft gear and third-rail shoes. A frequent repair is made on ratchet castings used to adjust shoes for collecting current from the third rail. There is a bolt fastened to each which holds it in place. On one type this bolt is attached by means of a shackle which is a part of the casting. The pin through this wears the holes which are then filled in and redrilled. Another type of ratchet casting has the bolt welded directly to it. When this bolt wears out it is a simple matter to cut it off and then weld on a new one.

Blowpipes are also useful for the repair of storage batteries used in subway cars. Old plates are taken out and new ones attached to the connectors by the familiar process of lead burning. A series of inverted U-shaped strips attached to a base form a jig to hold plates in position during welding.

Jigs are used wherever possible to speed up the work and aid in securing welds of good quality. An accompanying illustration shows one of these. The operator is building up small door latches. This jig was made easily by welding two short pieces in 1-in. x 1-in. angle iron, heel to heel.



Jigs speed up operation and aid in securing a weld of good quality. In this illustration the operator is building up a small door latch, a tiny jig being used

A table with a revolving top on which the work is clamped is another time-saving fixture. In the illustration the operator is shown welding the corners of a display card holder used on the dashboard. The four sides are cut with mitered ends from the stamped strips, then clamped in place on the table and welded. The corner clamps, which are held to the jig by wing nuts, have their outer ends cut in V shape so that one prong of the V rests on each side of the corner. The weld can be made between them. This is a production job that is frequently encountered in street railway shops.

One street railway operating several hundred cars had a need for special brackets to reduce motor vibration. These were made by welding a 1-in. bolt about 1 in. long to each end of 2-in. channels 2 ft. long.

Certain kinds of fabrication occasionally are done in some shops. As a general rule the engineering departments of good-sized systems are continually experimenting, changing designs and trying out new ones. For fabricating miscellaneous new equipment, or changing over old equipment to conform to new designs, the blow-pipe is useful. One alteration job consisted in cutting away a part of each axle cap to make provision for a new oiling system.

The specific uses mentioned are merely representative, being picked at random. They do not by any means cover the whole field. There are hundreds of places where welding can be used on electric railways. Each different type of truck or car offers some new possibility of saving time and money through the process.

The repair of shop machinery and the fabrication of special equipment in the power plant and shop need not be dwelt upon at length. Typical applications include mending large and small castings, restoring worn or broken forgings, fabricating steam lines and even constructing small metal frame buildings. When any part fails to function properly or it is considered desirable to modernize a piece of equipment, welding furnishes an easy method of making permanent changes at small cost. There is always room for developing new uses of this sort for the process.

Boston's Maintenance Code

ELEVEN principles which are fundamental to the success of the maintenance department and may be considered as essentials of success generally have been laid down by H. M. Steward, superintendent of maintenance of the Boston Elevated Railway. These were printed in handy form on a 2x6-in. card for distribution in connection with an address given by Mr. Steward.

The principles are as follows:

1. Do work well—100 per cent if possible.
2. Do it on time.
3. Teamwork and co-operation will accomplish much.
4. Be efficient.
5. Be loyal to the department and the railway.
6. Learn to obey orders so that you may give orders.
7. Do not be wasteful of material—or time.
8. Think.
9. Be sure you are right and then go ahead.
10. Treat others as you want to be treated.
11. You do not know what you can do until you have to do it.

Watch

the Condition of

Your Varnish

in Dipping and Baking

By John W. Jackson
Vice-President and General Manager
John C. Dolph Company, Newark, N. J.

"I WONDER what is the matter with that paint!" These are the words which too frequently come from the many electric railway users of insulating varnish. Reduced to its simplest terms, the problem in many shops consists in deciding upon the proper varnish, knowing and using the correct type of solvent, having specific information relative to the working gravity of the varnish and last but not least giving attention to the preliminary treatment of the objects to be impregnated. Many of the troubles experienced and the wrong methods used are the result of unfamiliarity with the properties of insulating varnish. "Know the Other Man's Job Too" was the caption given a recent article by one of the editors of *Industrial Engineering*. This reasoning is particularly applicable to the problems of insulating varnishes.

Great care may be exercised in the selection of a varnish, only to find later that the results are not as ex-



To apply tape or string band coat with oil-proof enamel and while still wet wind with cotton tape, painting as it is wound. Wind cord even over the painted tape and then cover cord and ends of commutator bars with another coat of oil-proof enamel

pected. The reasons for failure may be due to more than one factor. I will endeavor to discuss measures of omission rather than those of commission.

In many shops too little attention is paid to preliminaries. The cotton covering of wire, cotton tape and fibrous materials which go into the construction of coils absorb moisture readily, often up to 10 per cent of their weight. Many times this moisture is not driven out before the varnish is applied. It can be done only by subjecting the coils to prebaking at a temperature above the boiling point of water, or at 212 deg. F.

DON'T try to reinsulate or dip a used armature in varnish until the dirt has been blown off and the oil removed by a benzine moistened rag.

DON'T use varnish that is too heavy.

DON'T use varnish too thin.

DON'T thin varnish near an open flame.

DON'T fail to check up gravity of varnish before dipping coils.

DON'T try to mix benzine and varnish unless both are at about the same temperature.

DON'T expect a varnish to keep itself clean and free from dirt and lint from the coils. Take it out of the tank and filter it occasionally through four to six thicknesses of cheese cloth. At the same time clean out the accumulation of muck and dirt in the tank.

DON'T guess at the amount of benzine that may be needed to bring a heavy varnish to the right dipping consistency. Use a thermo-hydrometer and solvent chart and be sure.

DON'T try to establish the right dipping consistency of a varnish with a stick or stirring rod. Use a thermo-hydrometer.

DON'T fail to provide a close fitting cover for your varnish tank and see that the cover is down when the varnish is not being used. This precaution will save time and trouble and prevent undue evaporation of the volatile benzine solvent.

DON'T fail to provide a thermometer for the oven. With this the temperature may be controlled and it will prevent burning up the coils or underbaking the varnish.

DON'T neglect to ventilate the oven properly. See that openings are provided at the bottom for the access of fresh air, and openings at the top to carry off fumes driven off the varnish during the baking.

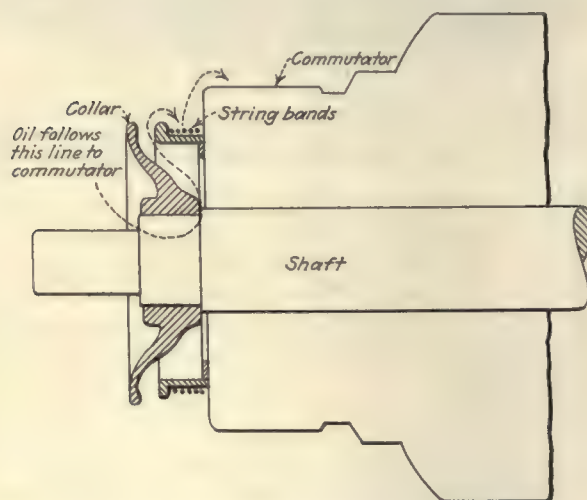
DON'T pull an armature from the varnish too quickly. Give it a chance to absorb the varnish and then pull it out slowly, and thus secure a uniform coating.

Prebaking is of value in other ways. The copper becomes heated uniformly expanding the air in the coil and the varnish penetrates quickly to the inner layers of the windings when the coil is immersed in it. It has also been found that prebaking shortens the regular baking period. The heat stored in the coil tends to assist in the quick expulsion of the solvent.

All varnishes should be maintained at a certain gravity. Gravity is governed by the type of base and the type and amount of solvent. High gravity solvents evaporate quickly, causing the varnish film to set too soon. The heavy coal-tar derivatives, while having high solvent properties, take too long to evaporate from the coil windings.

SOLVENTS OR THINNERS SHOULD BE GIVEN THOUGHT

The nature of many varnishes on the market make it necessary to use benzol as a thinner. As they become heavy and reach the "go-back," or livered, stage the



Path of oil seepage to string band and commutator

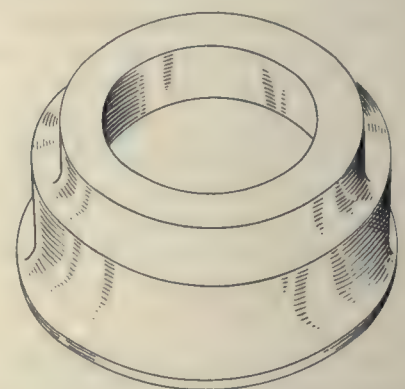
benzol solvents will bring them back to a usable condition. The light petroleum distillates have little solvent effect on varnishes of this character. Many men have found too late that after the so-called thinning of their varnish they have nothing but colored gasoline in their windings. The benzol types of thinner should never be used in any baking varnish. All these types of solvents present an extreme fire hazard, the flashpoint being below freezing. They will positively attack enameled wire. In addition it has been demonstrated that they are injurious to the workmen.

It is surprising to know how many men who are responsible, rely on the old stirring stick when determining the amount of solvent necessary to bring the varnish to its proper gravity. The temperature of the varnish at the time of its thinning should be known definitely. Temperature and gravity should go hand in hand. How many times have you seen men pouring in solvents and watching the flow of the varnish from the stirring rod as an indication that enough solvent has been introduced? Some men who are fortunate enough to have a hydrometer really exercise care in taking the gravity of the varnish but pay no attention to temperatures. Then again others take into consideration that it is necessary not only to take the gravity but are equipped with a hydrometer and a thermometer. Even with both of these it is surprising how much time can be wasted before the necessary amount of solvent is

poured into the varnish to reduce it to its proper working gravity. Our company, several years ago, saw that much time could be saved by working out a solvent chart which would indicate the number of gallons of solvent to be added to every 100 gal. of varnish in order to reach the desired specific gravity. A copy of this is reproduced here.

The varnish and the solvent should be at about the same temperature before endeavoring to introduce the lighter gravity solvent into the heavier-bodied varnish. The solvent should be added slowly while stirring vigorously until it is taken up entirely. Addition of large quantities of cold solvent will curdle the varnish, which renders it practically unfit for use. The best time to reduce the varnish is at the end of the day. It is then warm as the result of the continual dipping of hot coils, armatures and fields.

Periodical straining or filtering of the varnish is always advisable. No matter how care-



The inside of oil collar should be smooth and free from fine grooves

Use of the thermohydrometer (shown at left) eliminates guess work regarding proper consistency for dipping varnishes

fully they are cleaned continual immersing of machines is bound to leave a certain amount of dirt in the varnish.

In the opinion of the writer, next in importance comes the type of slot insulation. It should afford not only dielectric strength but mechanical protection as well. Many shops use untreated wooden wedges together with varied types and construction of slot insulation. Using these materials with no preliminary treatment, very little varnish gets down into and fills the slot. After repeated coats of varnish have been applied and baked in, it is obvious that no oil, dirt, moisture or any other foreign matter can reach the coils provided the varnish is absolutely oilproof.

Whether or not a varnish should be oilproof is causing a great deal of discussion today. In this connection our company through its representatives in the field has endeavored to get expressions from the men in the shops as to why motors go down and the causes for such failures in the order of frequency. Naturally first on the list is bearing trouble. Second is commutator trouble on d.c. motors. Third is lubricating oil which finds its way into the windings.

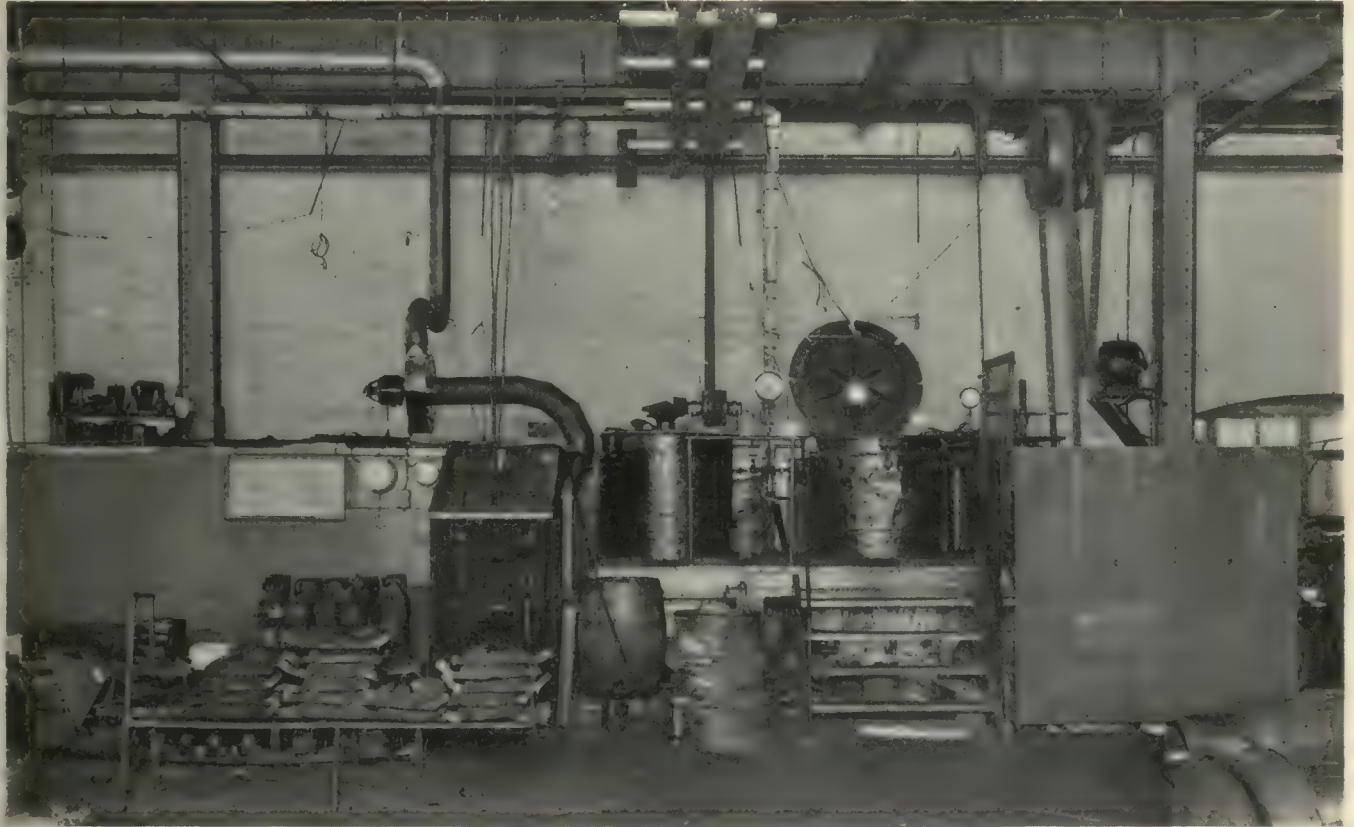
Lubricating oils, by carbonizing windings, cause breakdowns, particularly in compressor motors with splash lubrication using a light oil. Bursting bubbles throw a fine spray of oil into the air; the motor ventilating itself

draws this air against the windings. A chemical reaction takes place. The necessary agents for changing oil into carbon and water are present in the motor; they are the copper in the coils, heat from the windings, oil from the bearings, oxygen and ozone from the air. Coupled with heat, the oxygen and the oil, the copper in the coils acts as a catalyzer, breaking up the oil into carbon and water. The water evaporates while the carbon remains in fine particles on the insulation. Additional oil finds its way continually into the windings and if the insulating varnish is not immune it is only a question of time before the oil disintegrates the varnish film and carries the carbon and dust down into the coil windings.

The cleaning of motor windings should receive more

than the shaft. In using this method there is no drag on the shaft and the collar is placed easily and properly.

If there is seepage to the commutator the collar should be removed in the following manner: A gas ring made of ordinary 1-in. pipe with a slightly larger circumference than the collar, should be placed over it and heat applied for an average of seventeen seconds. With a clamp placed securely about the collar, approximately 1 to 1.5 tons hydraulic pressure will remove it. The collar and shaft can then be examined for grooves. These usually are very fine, but with the end play on the shaft they are sufficient to act as a pump, carrying the oil from the bearings under the collar, on the string bands and finally the deposit of carbon particles, dirt and oil cause



Carefully arranged dipping tanks and drying ovens will do much to insure satisfaction with insulating varnishes

attention. It will not only increase the life of the motor but also benefit the impregnating varnish. The cleaner the motor the less dirt and grease find their way into the varnish. Gasoline, benzine and carbon tetrachloride for the windings and alcohol for the commutators seem to have first call as cleaning fluids. Frequent, systematic and thorough inspection of all equipment as part of the routine should be the standard under which every shop management desires to operate.

CONTROL OF OIL SEEPAGE FROM BEARINGS TO COMMUTATOR

Oil seepage may be laid to the heat generated and to end play in the armature. Secondary reasons are, first, wearing of grooves in the collar and on the shaft; second, improper removal of the collar, and third, improper fitting of the original collar, causing the first grooves to occur on shaft and collar.

A collar to be placed properly should be heated to approximately 300 deg. F., and placed with a press fit. It should have an inside diameter about 0.004 in. smaller

a short circuit and burning out of the motor. The collar should be built up by welding and the inside surface made free of grooves. The shaft should also be free of grooves after which the collar may be replaced. This method of placing and removal of the collar aids considerably in overcoming the flow of oil from the bearings to the commutator.

"HOW MUCH DOES IT COST TO INSULATE?"

Many insulating varnishes today are bought not because of the protection they give but on account of their price. Such varnishes, no matter how cheap, are costing their purchaser many times their price. Cost records disclose that the cost of insulating varnish used is only a small fraction of the total cost of the rewinding.

Great strides have been made the last few years in an endeavor to overcome bearing troubles. There are still hundreds of motors operating which cause their owners more or less trouble from oil, consequently those motors should be dipped and baked in an insulating varnish which is absolutely immune to oil. Resistance to oil can

be obtained only when the coils are baked properly and sealed perfectly with the proper insulating varnish. If two or three dips are necessary to provide the proper seal the time and the small amount of varnish used will more than compensate for the additional trouble by prolonging the life of the machine. Many men, I find, are resorting to several additional coats of a spirit finishing varnish, which in addition to giving protection against oil, dries with a hard, smooth finish. Such a surface will prevent dust particles from adhering or cutting into the insulation. This type of varnish is an insulator only when thoroughly dry, so that if ground tests are made this point should not be overlooked.

Few armature repairmen appreciate the value of an

		Observed Specific Gravity																		
		Dec.	0.903	0.897	0.892	0.886	0.881	0.875	0.870	0.864	0.859	0.854	0.849	0.843	0.838	0.833	0.828	0.823		
		Dec. B.	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40		
Desired Specific Gravity	0.903	25	0																	
	0.897	26	3	0																
	0.892	27	6½	3½	0															
	0.886	28	10	7	3½	0														
	0.881	29	14	10½	7	3½	0													
	0.875	30	18	14½	11	8	4	0												
	0.870	31	22	19	15½	11½	8	4	0											
	0.864	32	27	23	19½	15½	11½	8	4	0										
	0.859	33	32	28	24	20	16	12	8	4	0									
	0.854	34	37	33	29	25	21	17	12½	8½	4½	0								
0.849	35	43	39	35	30	26	22	17½	13½	9	4½	0								
0.843	36	50	46	41	36	32	27½	23	18	14	9	5	0							
0.838	37	57	53	48	43	38	33	28½	24	19	14½	9½	5	0						
0.833	38	65	60	55	50	45	40	35	30	25	20	15	10	5	0					
0.828	39	74	69	64	58	53	48	42	37	32	26	21	16	11	5½	0				
0.823	40	84	78	73	67	61	56	50	44	39	34	28	22	17	12	6	0			

SOLVENT CHART
for
DOLPH'S INSULATING VARNISHES

Indicating the number of gallons of
58° benzine to be added to every one
hundred gallons of varnish to reduce
the varnish to the desired specific
gravity.

Example:- to reduce from 30B.
to 32 B.-8 gallons; from 0.864
Dec. to 0.843 Dec.-18 gallons

Dec. = Decimal scale
B. = Beaume scale

With 63° Gasoline use 15% Less than Shown. With 54° Benzine use approx. 10% More

Solvent chart showing thinner needed for an insulating varnish

oilproof insulating enamel for tape bands and string bands in the V at the end of the commutator. An oil-resisting insulation makes it easy to keep the bands clean and protects the exposed ends of commutators so that many motor troubles disappear. For this purpose there are oilproof enamels available. After the commutator has been turned down and the mica cone is ready for banding a coating of oil-proof enamel, followed while still wet with cotton tape the full width of the mica, can be put on, painting the tape as it is wound in place. Cord wound evenly over the painted tape, pulled taut, fastened securely in place and covered with enamel, will provide a waterproof insulation.

CORRECT BAKING NECESSARY

The dielectric strength of a varnish depends in a large measure on its correct baking. This requires economical heat distribution and a ventilating system to give proper air circulation. With poor ventilation it is not to be wondered at that baking for a period of from twelve to 72 hours is needed. Not a few persons consider an iron box large enough to accommodate several motors good enough for a baking oven. They introduce enough of heating units to give temperatures from 200 to 250 deg. F. and then arrange a lid or door so that the oven is almost hermetically sealed. Proper drying requires that the solvents which have been driven from the varnish should be carried off. These vapors not only retard the drying but are a fire hazard and sometimes have caused explosions. In any oven a large part of the heat is absorbed by the metal parts of the interior before the oven is brought up to its correct temperature. Unless the metal

frame is protected with some good heat insulating material the cost of operating the oven will be high. Too much air circulation retards baking, so the mere placing of openings in an oven for the inlet and outlet of air does not constitute a real ventilating system. The openings should be proportioned and located to provide for the proper air circulation.

New Automatic Power Plant in Operation

WITH the completion of the new automatic power plant at Alouette the British Columbia Electric Railway will add 12,500 hp. to its hydro-electric system on the lower mainland of British Columbia. This new power source cost approximately \$2,500,000.

The new power plant is located about 25 miles due east of Vancouver. The nearest point on either roadway or railway was Haney, and the first work to be undertaken by the company after deciding to develop the water power of Alouette Lakes was to establish the necessary transportation communication.

A tunnel has been driven from Alouette Lakes to the Stave River and a dam built to raise the level of the lakes to permit the necessary diversion, and to increase the storage capacity. The new plant will supply power to the lower mainland of British Columbia and is an indication of the confidence which the British Columbia Electric Railway has in the future of this province.

New Color Scheme for Baltimore Cars

FOR NEARLY a year the United Railways & Electric Company of Baltimore, Md., has been operating cars of various colors and color combinations with the idea of learning which colors stand up best and at the same time are most popular with the public. Residents of the city were requested to make suggestions and hundreds of letters were received.

The color scheme, which was adopted for rear entrance cars, is one of the most popular with the people and also has proved to be one that will best withstand the elements. The body of the car is a dark red, the trimming around the windows is cream and the roof is buff.

Since the test was started there have been many letters received urging the company to adopt various shades, one of the earlier leaders being solid green. Careful check, however, showed that this color did not meet the test and after the cars painted this hue were in use for a few months it was found that they appeared to be soiled. For this reason the company decided that another color would be better.

A great many persons favored the combination that has been adopted and when the tests showed that this stood up as well as any of the others and better than most, the officials decided that it should be the combination for all the rear-entrance cars.

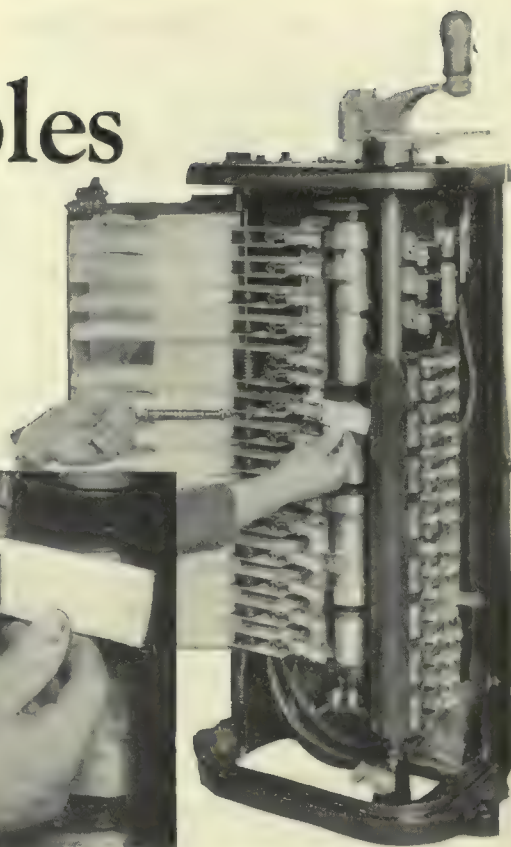
Bright red and blue met with considerable favor on the part of the public but in announcing the official action of the company, Raymond S. Tompkins, assistant to the president, said it was found that both of these colors faded. The company will have the new combination of colors used on all the cars to be painted as quickly as possible.

Freedom from Controller Troubles

*Depends on
Thorough Maintenance*



Contact pressure is measured best with a spring balance and a wire loop. Pulling on a strip of paper between the contacts indicates when the pressure is to be read



Correct pressure adjustment of contact fingers prevents arcing and reduces wear. Records of failures assist in maintenance. Too much lubricant is as bad as too little

By R. S. Beers

Railway Engineering Department General Electric Company

MAINTEINANCE of control equipment on street cars is one of the important factors in their successful operation. It seems impossible to put a finger on any one method of maintaining apparatus and say this is "it." Differences in climate, conditions of operation, etc., are the determining factors. Only one type of maintenance has proved unsuccessful wherever tried. It is "deferred" maintenance. In electric railway control devices, dust, dirt, carbon and metal particles are the things that cause trouble, and it really settles down to a question of cleanliness as the price one pays for freedom from trouble.

The best practices are found on properties where overhaul of the equipment is on a mileage basis. At the overhaul periods it is dismantled completely, all parts cleaned and any that would wear out before the next overhauling are replaced. When reassembled the apparatus is tested thoroughly and goes back on the road with the same factor of safety it had when originally put in service. Pull-ins for equipment failures are then very infrequent.

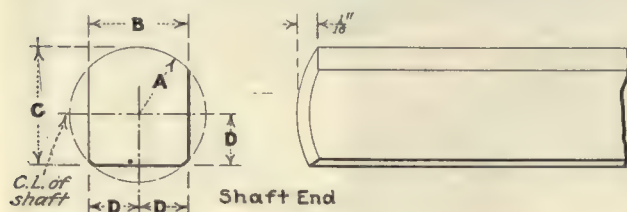
The cost for this method is less than on some companies that never overhaul their equipment and only replace parts when they fail in service or are found completely worn out at regular inspection.

Records may appear a nuisance instead of a help, but when made simple, they serve a purpose that nothing else does. If only one record is kept it should be a pull-in record, showing the miles operated for each pull-in on account of equipment failures. When this is plotted on a graph and circulated about the property a desire to increase the miles per pull-in can be built up. That will point out the desirability of further records, which in turn will make possible an intelligent survey of troubles experienced and also give data for their analysis and correction. In addition they will give reliable information about the life of equipment and renewal parts that may be used by the storekeeper to keep on hand adequate stocks of renewal parts and raw materials.

With the modern K-type controller, inspection should consist of occasional oiling of the bearings; trying the

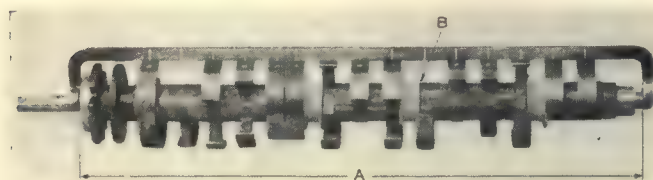
star wheel and drum castings for tightness; replacing worn parts, such as star wheel pawls, pins, fingers, segments and arcing plates; examining the cutout switch for contact, making sure the proper mechanical interlocking between main and reverse drums is present; trying contact pressure of the reverse fingers; adjusting the drop of the main fingers; filing roughened segments, and replacing worn-out segments and burning tips.

The two essentials for the successful and economical operation of controller fingers and segments are lubrication and contact pressure. Without the former both finger and segment wear rapidly and the motorman complains that the controller turns hard. The best lubricant is a high flash point oil or grease. For ordinary temperatures a grease of about the consistency of vaseline gives the best results. The tendency is to use a generous amount of lubricant because too little makes itself evident by roughened fingers and segments. When too much is



Part	For Shaft Diam.	A	B	C	D
7	7/8"	.04375 ⁺ .0000 ⁻ -.00015"	.06875 ⁺ .0000 ⁻ -.0002"	.078125 ⁺ .0000 ⁻ -.00025"	.034375 ⁺ .0000 ⁻ -.0001"
8	1"	.0500 ⁺ .0000 ⁻ -.00015"	.0759 ⁺ .0000 ⁻ -.0002"	.08795 ⁺ .0000 ⁻ -.00025"	.03795 ⁺ .0000 ⁻ -.0001"

Correct broached dimensions for 7/8-in. and 1-in. controller shafts



Template for locating body castings on controller cylinder

used a part of it falls on the surrounding insulation and collects dirt and copper dust with a tendency toward insulation failures. The best practice is to spread a liberal amount of lubricant over the segment, turn the controller drum back and forth several times, and wipe around the fingers and the segments to remove any surplus.

CORRECT ADJUSTMENT OF CONTACT PRESSURE IS IMPORTANT

Adjustment of the main fingers is next to lubrication in importance. Usually they all should leave the segments at the same time when turning to the off position from the first notch. This is particularly necessary with the older types of controllers, such as the K-6, K-10 and K-28, where the factor of safety is none too large when rupturing the arcs with the present-day voltages to which they are subjected. After this adjustment the inspector turns the controller to the on position and judges whether the drop of the finger is enough to give good contact on all notches and not sufficient to cause it to stub. The above factors determine the proper amount of drop, which will vary from 3/32 in. to 1/4 in. With new controllers 1/8 in. or less is sufficient, while with worm segments and worn controller bearings the higher value may

be necessary. Too much drop makes the controller turn hard, wears the fingers and segments rapidly and, most important of all with flat spring fingers, gives a shock to the finger spring when it strikes a segment that often reduces its life to less than that of the contact tip. A broken finger spring usually means a pull-in.

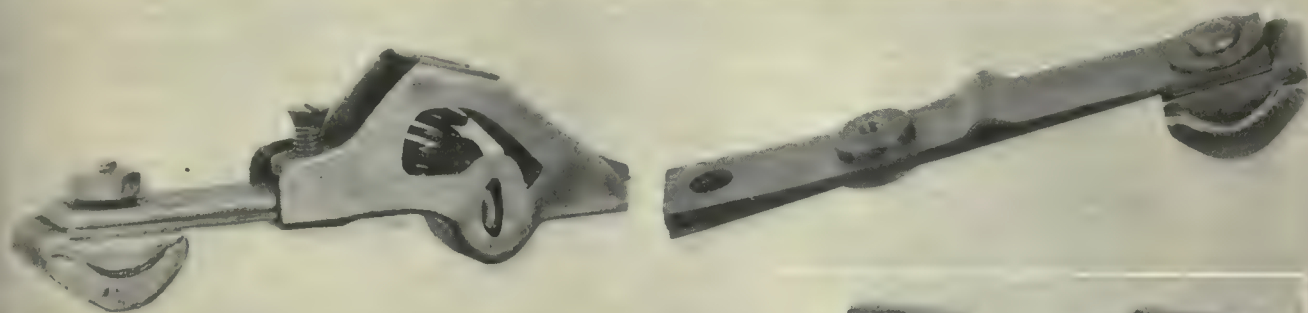
With the hinged and self-aligning types of controller fingers, where pressure is applied to the contact by means of a compression type coil spring, this difficulty is removed and the operator has more latitude in the adjustment of the fingers. On the other hand, if the fingers are given too little drop there is insufficient pressure, with poor contact between finger tip and segment with the possibility of an arc which not only destroys the finger and segment, but sometimes causes a controller blow-up. It is obvious that, as controller bearings wear, the cylinder does not rotate in an exact circle, and the pressure at the point of contact of the finger and segment varies. It is then necessary to give the fingers sufficient drop to insure good contact at all points in the rotation of the controller drum.

Pressure between the finger and segment is dependent on the shape and size of the finger spring. The pressure of the main fingers on drum controllers should be not less than 4 nor more than 8 lb. A considerable variation in finger pressure can be made by bending the finger spring to a new shape. Usually an inspector can tell by the feel of a finger whether it has the right pressure or not. When measurements are desired they can be made with a small spring balance and a wire loop or stirrup.

SAND BLAST IS SATISFACTORY CLEANER

When overhauling a drum controller it is best to remove it from the car and dismantle it so that the various parts may be examined and repaired. The most important thing in overhauling a drum controller is to clean it. The quickest, easiest and cheapest way of cleaning the insulating parts of the controller such as the arc deflectors, main and reverse finger blocks, and the controller drum is to use a sand blast. A number of satisfactory sand blasts are on the market and it is possible for an operator to make a simple one himself. Wherever air is available, no method can equal the sand blast for cleaning controllers and putting them in good shape. In addition, if the brass and copper parts are dipped in a cleaning bath they will have a much better appearance. After the wood parts have been cleaned, they should be given one or two coats of insulating paint or varnish. The smoke, soot, and dirt which collect in the controller are readily seen on a clear or red varnished surface and wiped off, while on a black surface they remain undetected. The deflector parts on which the arc strikes should not be painted with any kind of varnish. In a number of instances operators have had trouble from this source. When heated paint and varnish give off a gas that burns easily.

The bearings for both main and reverse drums should be examined and when badly worn should be rebushed. The broached end of the main drum where the handle fits should be measured. If badly worn it should have a sleeve put on or else be built up and remachined. Dimensions for 7/8-in. and 1-in. shafts are given in an accompanying diagram. When manufacturing controller cylinders the broached end is made first and the star wheel and drilling of the segment screw holes located from it. By reversing this process the proper location for machining the rebuilt shaft may be determined.



Main contact fingers—Top views—At left, new hinged type; at right, flat spring type. Lower views—Left, contact tip for hinged type finger; right, contact tip for flat spring type



A simple template for correctly assembling and spacing the body castings on a controller shaft, can be made easily so that the cylinder may be installed in a controller and turn freely. The space shown as *A* is the distance between the bearings in the controller frame and cap plate. The white lines that register with the segment screws locate the body castings so that the fingers line up with the segments when the drum is put in a controller.

When a controller cylinder is dismantled small felt washers are found separating the ends of the body castings from the insulation collars or space blocks indicated by *B*. These felt washers have an important function in keeping copper dust from working into any crack between the casting and the insulation collar where it builds up a conducting path from one body casting to the next. If felt washers are not available paint, string or asbestos paper may be used to close the cracks. Until recently the controller shaft and its insulation were made in a single unit, making it obligatory to replace both when either failed. Now the insulation is formed in a separate hexagonal tube and may be placed on any shaft.

HEXAGONAL SHAFTS PREVENT THE LOOSENING OF BODY CASTINGS

Early controller drums were made with a round shaft and insulation sleeves which separated the shaft from the body castings. The jars and shocks received in service often caused the parts to loosen. The only safe method of tightening loose body castings is to renew the insulation, which requires a complicated reheating fixture for each type of controller cylinder. The cure for loose body castings is a controller drum with a hexagonal shaft, a type that has been in successful use for twenty years.

There are no other changes to a controller which will reduce the likelihood of blow-ups as much as replacing steel covers with wooden ones. For years the covers for drum controllers have been made of ash wood and finished with a coat of varnish. Recently the wood was changed to cherry and the finish omitted so that the cover could be stained to match the car interior. A heavy paper shield protects the surface of the wood during shipment.

When overhauling drum controllers the wiring should be examined. If the rubber is in poor condition; that is, hard and brittle from age, or soft and mushy from grease or oil, it should be replaced. Standard cable is preferable to solid wire for this purpose. On controllers using it, the single blowout coil should be removed and

treated exactly like a motor field coil; that is, tested for shorted turns, dried out in the drying oven, dipped in insulating varnish and baked.

Frequent improvements are made in the detail parts of drum controllers. Whenever a change is decided on, every effort is made to design the new part so that it may replace the old part without cutting and fitting. Users of drum controllers are furnished 1928 model repair parts for a 1910 controller. As an example let us take the K-35 controller of 1920 and today. The frame has had cable troughs added. The cap plate has been changed to include machined pads for installing an LB control device, TA handle switch or Safety Car Devices handle. The main cylinder has an insulating tube that is renewable instead of being made an integral part of the shaft. Three changes have been made in the segments: First, a better type of burning tip known as the lap type; second, a slight increase in the length of several segments that increases their life several times, and third, elimination of dowel pins in segments. The dowel pin is replaced by a copper key made an integral part of the



Burning tips—Top views—At left, new style lap type; at right, above—Old style lock type. Lower views—At left, new style with key; at right, below—Old style with dowel pin

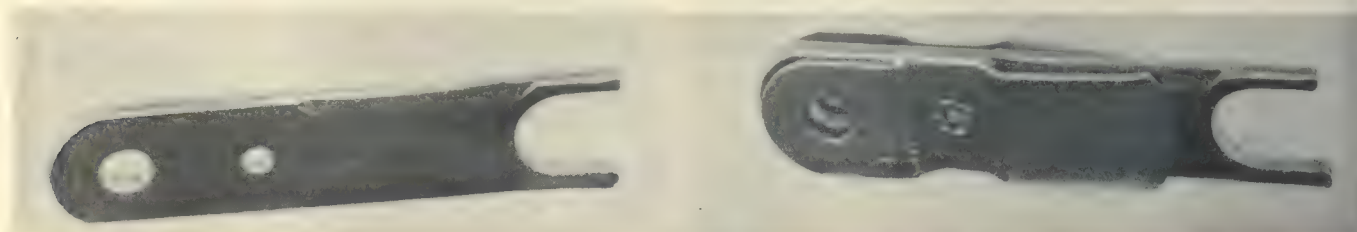
segment. The main fingers of the flat spring type have been replaced by the hinged type in which a coil spring produces pressure at the point of contact. This is the most important improvement in finger design during recent years.

Fingers of the hinged type are available for old types of controllers such as the K-8, K-10, K-12 and K-28, as well as the newer controllers like the K-35, K-36, K-39, K-40, K-63, K-64 and K-75. The contact tip on the hinged finger is held in place by a nut and a screw, while the flat spring finger has it riveted in place. The two forms of tip are interchangeable, so when tips are renewed on flat spring fingers the nut and screw type can be substituted.

The 1920 model of motor cutout was a simple knife-blade switch. Today the blade is reinforced so that the switch jaws cannot spread and overheat because of poor contact. Today, all cables are soldered to terminals and bolted in place instead of the strands being squeezed under a clamp. The line breaker or line switch has come

a failure on others. Whether it is a success or failure depends on the amount and kind of dirt encountered. Often the dirt and oil mixture forms a grinding compound that wears the bearing pins and their bushings faster than when no lubricant is used.

One of the functions of the line breaker is to open the circuit on overloads. When a motor flashes over or a cable grounds and an excessive current flows, the line breaker is called upon to open the circuit and prevent serious damage. This requires that it be kept in good electrical and mechanical condition. For this reason the line breaker should be removed from the car at general overhaul or when the car goes through the paint shop, and be put in as good condition as when new. First it must be torn down and cleaned. The operating coil should be heated, dipped and baked the same as a field coil except that the drying out should last only a couple of hours and the baking not more than six hours. All worn parts, particularly pins and bushings, should be renewed. The contact tip pressure should be



Cutout switch blades. At left, old style; at right, new style with reinforcing

into general use with K controllers in recent years. Its main functions are to take a large part of the arcing away from the controller fingers in normal operation, making inspection and lubrication less frequent, and to open the main circuit in an overload and protect the equipment from injury. It replaces the usual hood circuit breaker and removes from the car platform all excessive arcing.

LINE BREAKERS NEED CLOSE ATTENTION

With line breakers, the parts requiring attention at inspection are the main contacts, all control circuit contacts, the arc chute, loose terminals and worn parts. When the contact tips are held by a single screw, a socket wrench should be used for tightening them. If they do not remain tight, new bases carrying the contact tips should be installed, as a contact tip base or support on which the tip loosens is a potential source of control failure and pull-ins. Contact tips should be replaced when worn half-way through. Roughened contacts should be filed smooth. Control circuit contacts should be cleaned and tried for pressure when closed. Arc chute parts that direct and cool the arc should be free from copper particles. When a hole is burned half-way through an arcing plate, it either should be replaced or the hole should be filled with an arc cement. To obtain successful results with arc cement it is necessary to clean the hole to be filled thoroughly.

In addition to the above, pneumatically operated line switches require that the air cylinder be lubricated, that the magnet valve be tested by air for leaks and the line switch tested for quickness and snap of action by opening and closing the line switch by means of the push pin on top of the magnet valve. Lubrication of the pin bearings of a line breaker is successful on some railways and

measured and new pressure springs installed if needed.

The contact pressure is measured with a spring balance as shown in an accompanying illustration. Pulling on the piece of paper between the tips indicates when to read the pressure. As contact tip pressure varies with each design of line breaker, the correct tip pressure for each type should be obtained from the manufacturer. Magnetically operated line breakers will perform successfully if they have a tip pressure of 7 lb. or more. On a new line breaker the pressure should be considerably more than 7 lb. because the pressure falls off as the tips wear and pins become loose in their bearings.

The overload relay should be tested and set at the correct trip point on the circuit breaker testing rack. In addition the pneumatic operated line breakers should have the piston packing examined and softened or renewed if necessary. The magnet valve stems should be measured for wear. Properly made magnet valves should operate at least three or four years before renewal of valves and valve seats is necessary.

When hood circuit breakers are used instead of line breakers for opening the circuit on overloads and other excessive currents, it is particularly important that they be kept in the best possible operating condition. Like all other control devices, they should be kept clean. Next in importance is the mechanical condition which should be such that the latch and other parts operate when needed. Then comes the arc chute which should be kept free from holes, copper dust and soot. Lastly, the contacts require enough pressure so they do not overheat.

To reduce the amount of flashing in the car when a circuit breaker opens, on some properties small houses are built over the arc chute. This is good practice provided sufficient windows are left open in the housing for the expansion of the arc.

into consideration. This table shows the sizes of cables as adopted as standard by one of the large motor manufacturers.

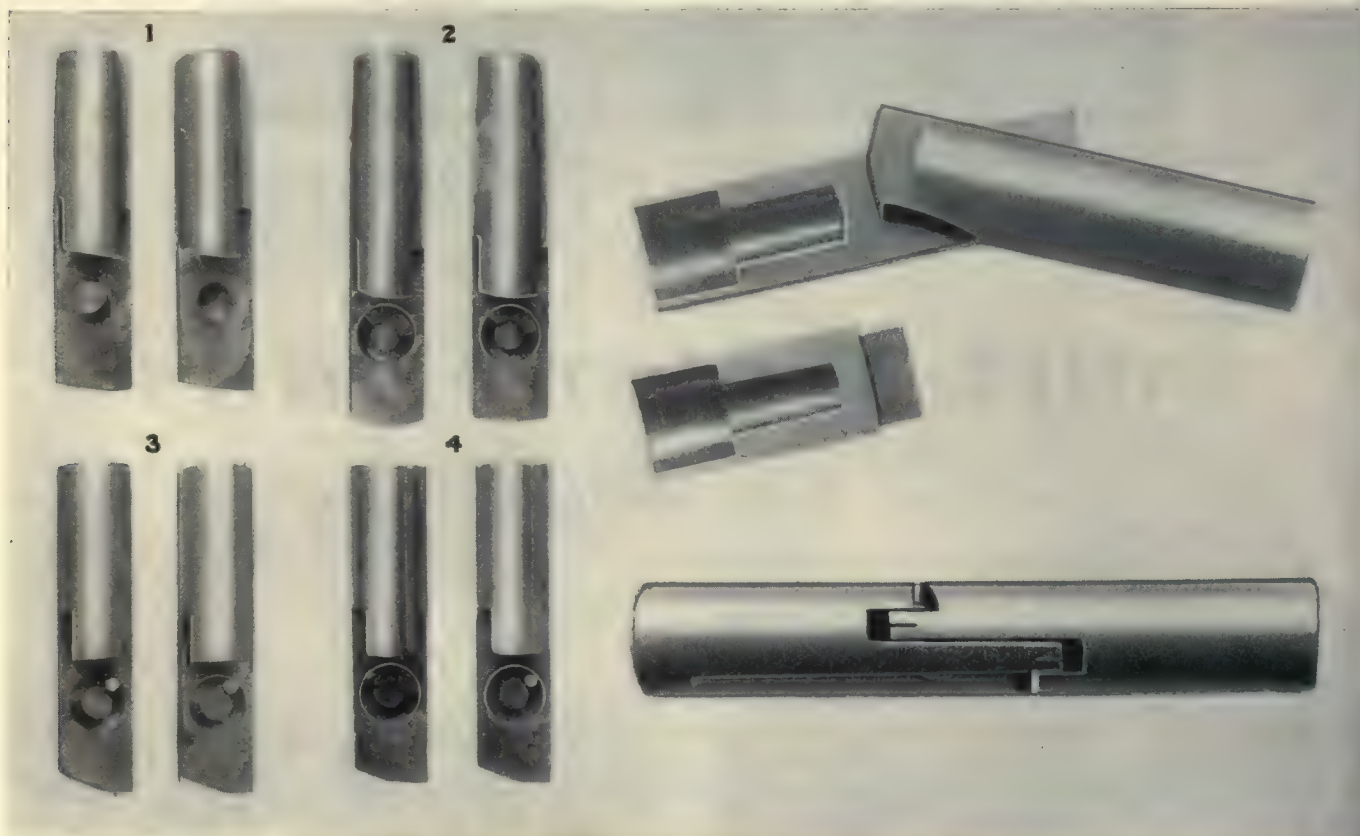
CAPACITY AND DIAMETER OF MOTOR LEADS				
Motor Rating Hp.	Cable Size Circular Mils.	Dimensions in Inches		Length of Lead Outside Motor Frame
		Cable Diameter	Outside Diameter	
Up to 45	29,000	0.20	0.56	4
46 to 80	52,000	0.30	0.66	5
81 to 120	83,000	0.38	0.77	5
121 to 160	110,000	0.43	0.83	6
161 to 210	142,000	0.50	0.90	6
211 to 260	180,000	0.56	1.02	6

Without dependable connectors of proper design on the cable ends, there is always more or less trouble experienced with loose connections. In an accompanying

an end of the two separate elements of the connector, which in turn are held together by two machine screws. With proper locking of the screws this type can be made very reliable, but it is rather unhandy to disconnect.

In the fourth method a connector of somewhat similar design is made from copper tubing. Results have demonstrated that this is not quite as good as the third type as the insulation over the ends of the cable is not protected by the connector. Bending occurs continually in service and in order to prevent breakage of the strands of the cable, the bending should be distributed over a considerable length, if possible.

The fifth method shows what has been commonly known as the knuckle-joint connector, which is a quick break type. This type of connector is used largely on railways to connect the motor leads to the car wires and has been made in various designs. Four general types



Various designs of motor lead or knuckle joint connectors leading up to the present standard new style pin type

No. 1—Old-style pin or pivot type. No. 3—New-style pin type.

No. 2—Segmental type.

No. 4—Combination of segmental type with new-style pin type.

illustration five methods are shown which are used to join two cable leads by connectors which can be readily separated. The first method, shown at the top, consists of the simple two-way, solid-type connector where both ends of the cable are held in place by machine screws. With this type there is always danger of leads becoming broken. Screws will loosen due to vibration and where the cable is placed in the terminal without an added sleeve, the point of contact of the screw is sure to cut the individual wires and eventually result in breakage.

The second method shows one of the leads soldered permanently into the connector. This is a slight improvement over the first method but still at one end it uses screws which are liable to loosen.

The third method illustrates what has been commonly called a screw connector. Each lead is soldered into

of knuckle joints have been used most extensively. The first of these is the old style pin or pivot type, in which a heavy steel hinge pin is riveted in the face of one of the half elements. As will be seen in the illustration, there are a male and a female element, which are not interchangeable.

The second form has been termed the segmental type. In this a small brass segment is riveted in a circular groove in the face of each half element, so that both elements are alike and the two halves are interchangeable. This type has a limited use as it is suitable for connectors of $\frac{3}{4}$ in. diameter or larger.

A third design is the new style pin type. In this a small steel pin replaces the brass segment of each element of the segmental type. Both elements are alike and the halves of the connector are interchangeable.

Further, any element of this type is interchangeable with any element of the same size connector of the segmental type. This design was originally developed for connectors of $\frac{1}{8}$ in. outside diameter. However, due to its broader application, it was finally adopted as the most economical construction for all sizes of connectors.

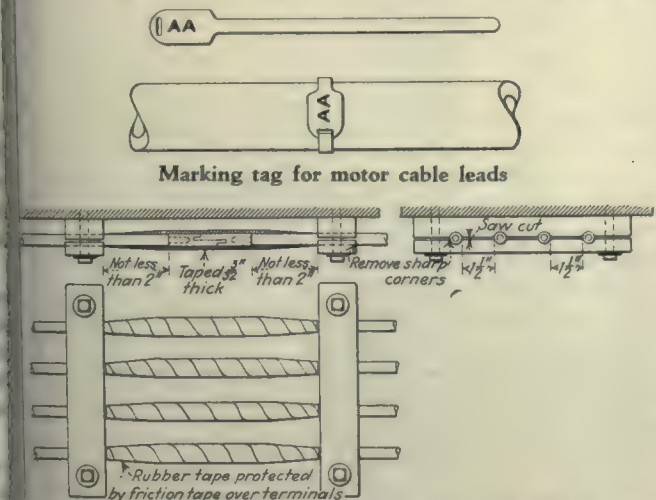
The fourth type, sometimes called the jack-knife or clasp type, is used almost exclusively by two large motor manufacturers on the cable leads of their railway motors. The accompanying table shows the important dimensions of the standard size connectors, and the horsepower ratings of the motors for which they should be used.

Motor Rating, Hp.	DIMENSIONS OF KNUCKLE-JOINT CONNECTORS					
	Outside		Counterbore		Drill for Cable	
	Length	Diameter	Depth	Diameter	Depth	Diameter
Up to 45	3½	1½	None	None	1½	1½
46 to 80	4½	1½	None	None	1½	1½
81 to 120	5½	1½	None	None	1½	1½
121 to 160	5½	1½	None	None	1½	1½
161 to 210	6½	1½	None	None	2	1½

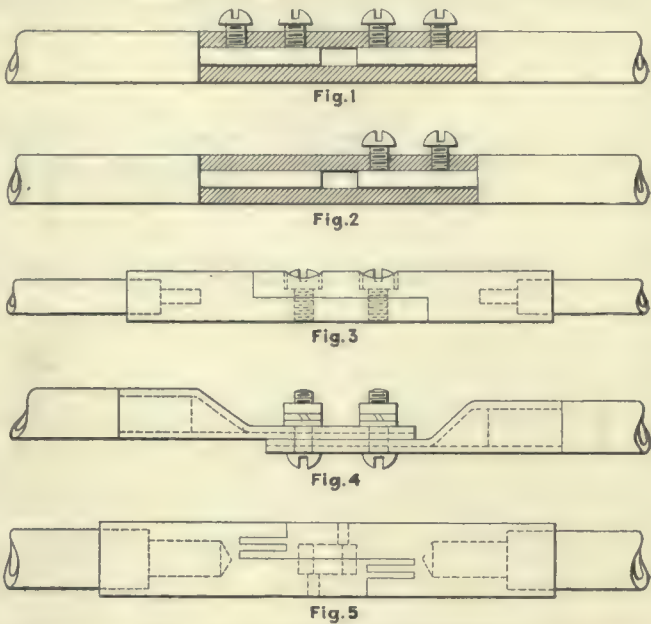
One of the most important advantages of the jack-knife or clasp type of connector is that the quick break simplifies connecting and disconnecting of the motor leads. Slotting of the tips secures a spring action which improves the contact fit of the two rubbing surfaces. To be satisfactory, they must be made from a good quality of brass rod. There must be a large contact surface between the halves finished smoothly and fitted carefully to obtain a good electrical connection. The half elements of the same style must be identical so that all connectors of the same size are interchangeable. Ends of each half element into which the cable conductor is soldered are machined to provide a support for the insulation at the cable end.

PROTECTING CABLE LEADS

To insure that the motor cable leads give the least possible trouble after connections are made to the car wiring cable, a number of precautions should be taken. Cable leads should be protected where they come out of the motor frame by a semi-hard rubber bushing. The leads must be made long enough to accommodate the full swing of the truck and suitable cleats should be used to hold the leads securely to the motor frame. It is also essential that similar cleats be used to hold the car wiring cable to the body of the car. Leads should be hung so



Method for insulating and cleating motor leads with knuckle-joint connectors recommended by the A.E.R.E.A.



Types of cable lead connectors

- Fig. 1—Solid type connector, each lead held by two machine screws.
- Fig. 2—Solid type connector, one lead soldered and the other held by two machine screws.
- Fig. 3—Jointed type connector, each lead soldered, halves held together by two machine screws.
- Fig. 4—Jointed type connector, each lead soldered, halves held together by two machine screws and nuts.
- Fig. 5—Jointed type connector, each lead soldered, halves held together by their spring action commonly called knuckle-joint, jack-knife, or clasp type.

that under all conditions they will swing free to avoid chafing and rubbing on any car parts. If it is not possible to prevent rubbing and chafing of the leads on top of the motor frame, some protection should be provided to keep the insulation on the cable from wearing through.

The knuckle-joint connectors should not be placed in the swing loop between the car underframing and the motor. When in place, the connectors should be insulated by using a piece of canvas or rubber hose. This should be taped at the ends to keep out water, dirt and dust. The point of support of the leads from the car body should be as near the truck center pin as possible in order to keep the swing of the leads to a minimum.

In the interest of standardization, both of the large railway motor manufacturers have adopted a common standard for the marking of railway motor cable leads. The following shows the new and old markings on the cable leads for Westinghouse railway motors.

Leads	New Markings	Old Markings
Armature connected to brush holder.....	A	A+
Armature connected to brush holder or commutating pole field.....	AA	A—
Main field.....	FF	F+
Main field.....	F	F—
Steel control lead.....	M	FM

All main wiring diagrams of Westinghouse railway motors dating from February, 1925, show both the old and new marking as indicated in the above table. Diagrams made before this date show only the old markings. All main wiring diagrams of the General Electric Company's railway motors show only the new markings.

The leads on the Westinghouse motors are marked with small tin tags, as shown in an accompanying illustration. These are tightly fastened to the cable.

G. R. Fanning

*Wins Maintenance Competition Prize for
Month of February*

EQUIPMENT used for testing pneumatic door engines as used in the shops of the Toronto Transportation Commission receives the \$25 monthly prize for February in *ELECTRIC RAILWAY JOURNAL*'s Maintenance Competition. Honorable mention goes to W. J. McCallum, foreman frog shop, way department, Toronto Transportation Commission, for his description of a machine for grinding heel recesses in switch castings.

AIR operated door engines on cars are coming into general use, and to insure proper operation should be tested carefully at each overhauling. The method used by the Toronto Transportation Commission of providing a model with weighted doors on which the door engine can be placed quickly and be given a test with conditions such as are encountered in service provides a satisfactory means for turning out this work. Installation and removal of the engine being tested is accomplished easily and in a short time.

A description of the test equipment used by the Toronto Transportation Commission was described in the Feb. 18 issue of *ELECTRIC RAILWAY JOURNAL* by G. R. Fanning, foreman of pneumatic section at the Hillcrest Shops, Toronto, Canada. This was awarded the monthly prize of \$25 as the best maintenance item published in that issue.

Another practice used by the Toronto Transportation Commission receives honorable mention. This was the machine for grinding heel recesses in switch castings as described by W. J. McCallum. Switch recesses have a bad habit of wearing so that the heel of the switch tongue fits only where it touches. The device described ap-

pears to fill the need for a grinding equipment suitable for doing this work in the field without the necessity for removal of the switches from the track.

April 30 Closing Date for New Material

ACCORDING to the rules for *ELECTRIC RAILWAY JOURNAL*'s Maintenance Competition, as published on pages 700-701 of the April 16, 1927, issue, twelve monthly prizes of \$25 each were to be awarded beginning with the May 21, 1927, issue. Due to the awarding of the capital prizes in September, no monthly prize was awarded that month, so the last monthly prize will be awarded for articles published in the May 19, 1928, issue of *ELECTRIC RAILWAY JOURNAL*, and as has been frequently announced in these columns, the closing date for material to be eligible for one of the monthly prizes is April 30, 1928.

This means that those who still have material that they wish to get in before the contest closes must send it in at once. Many have already expressed a desire to send in articles, and it is hoped that all maintenance men will avail themselves of this opportunity so as to get their material in promptly. In



Gilbert Robert Fanning

who won the \$25 monthly prize for February in *ELECTRIC RAILWAY JOURNAL*'s Maintenance Contest, is the leading hand in the pneumatic section at the Hillcrest Shops of the Toronto Transportation Commission, Toronto, Canada. Mr. Fanning left his position in the repair department of the T. Eaton Company, Toronto, in 1915, to enlist in the Canadian Expeditionary Forces for overseas service with the 95th Regiment. Later, he was transferred to the 1st Battalion Canadian Railway Troops, and served overseas until the completion of the war. On returning from service Mr. Fanning entered the employ of the Toronto Civic Railway as a motor and truck mechanic, and continued in this service until the amalgamation of the Toronto Transportation Commission, the Toronto Street Railway and the Toronto Civic Railway. Mr. Fanning was born and attended the public schools in Toronto. His first mechanical experience was in connection with his apprenticeship, which he served in the blacksmith and machinist trades with a carriage manufacturing company in Toronto.

connection with material already received which has not been published, and material sent in during the next month, there will be an important announcement made in the April 21 issue.

Electric Railway Journal Maintenance Data Sheet

TRACK AND WAY DEPARTMENT—22

Anchored Crossings That Will Not Drift With Traffic*

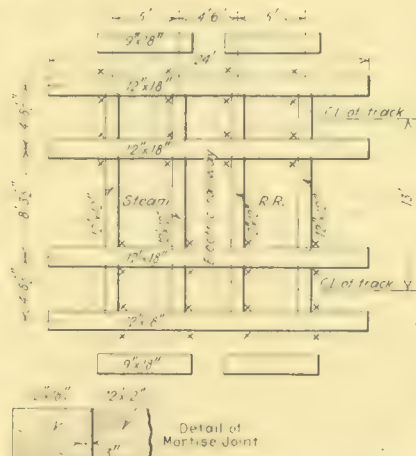
BY A. E. GLEASON

Assistant Superintendent of Construction Louisville Railway, Louisville, Ky.

STEAM over electric crossings can be kept from drifting with steam traffic by use of a method of anchoring that is used by the Louisville Railway, as shown in the accompanying illustration. Timbers of appropriate size are framed into the construction. Crossings are of solid manganese 6 in. deep with 1-in. continuous plates, which are the same width as the timbers on which they rest. The crossings are fastened securely to the timbers with 1-in. bolts.

Excavation is carried well beyond the outside joints to a depth of 5 ft. The concrete slab is poured to a

depth of 3 ft., using a 1:2:5 mix. As the slab is being poured 5-ft. lengths of old 9-in. girder rail are placed as shown in the sketch. These are inclined in the direction opposite to travel on the steam railroad tracks. The tops of these rails come to within 4 in. of the top of the running rail. After the slab is set well the crossing is air tamped with dry concrete of 1:2:5 mix. The concrete is then brought up to within 3 in. of the top of the rail paving grade. The crossing is paved with Kentucky rock asphalt or cold patch preparation with asphalt base, making a water-tight job.



Installation used by the Louisville railway to keep crossing from drifting with steam traffic

X Indicates short section of 9-in. rail embedded in concrete and inclined in the direction opposite to travel on the steam railroad.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—TRUCKS—21

Reclaiming Ball Type Brake Shoe Hangers*

BY JOHN MCDOWELL

Foreman Blacksmith Toronto Transportation Commission, Toronto, Canada

REMOVAL of ball type brake hangers on cars of the Toronto Transportation Commission is due principally to the cup bushings becoming worn. In reclaiming these for further use the hangers are machined with a special tool and new cup bushings, forged and hardened, are installed. This effects a great saving of material, as the original hangers can be used several times, only the cup bushings requiring renewal. The accompanying illustration shows a new hanger, a hanger with worn ball and a hanger machined to receive the cup bushing.



At left, new ball type hanger. In center, hanger with worn ball. At right, hanger machined to receive cup bushing

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Electric Railway Journal Maintenance Data Sheet

TRACK AND WAY DEPARTMENT—23

Convenient Mounting for Electric Shovel Truck*

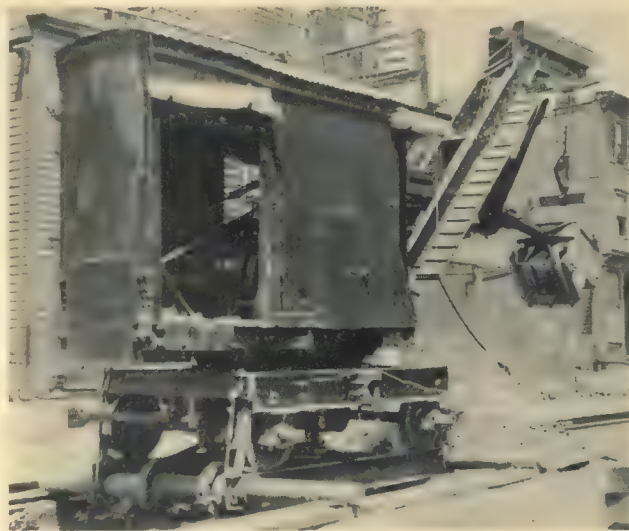
By J. A. MCCARTNEY

Superintendent of Construction Pittsburgh Railways, Pittsburgh, Pa.

RIGID mounting, such that track obstructions usually encountered will not interfere with the progress of the work is provided in an electric shovel incorporating several novel features that has been developed by the Pittsburgh Railways. This was constructed from a standard shovel truck and the mounting provided enables from 500 to 700 ft. of trench excavation 2 ft. deep per day. It has advantages over the caterpillar type of truck in wet weather and also makes possible the use of short sections of portable track in the trench.

For an electric shovel to operate at maximum efficiency on street railway track construction it must be able to operate in all kinds of weather at full capacity and must not require too many attendants. Frequent adjustment of auxiliary equipment is undesirable and the equipment must be sufficiently flexible so that trench obstructions, such as gate boxes, sewer, water and gas lines may remain undisturbed without slowing up the work.

The truck illustrated weighs about 3 tons. It is transferred from one job to another with the company's 5-ton road crane. As shown in the illustration, the



Electric shovel truck facilitates excavation for track reconstruction work

rollers rest at one end on 2-in. planks placed on the street flank, while the other end, which is grooved, is supported by light-weight T-rail sections spiked to the ends of the ties of the adjacent track. The shovel has a drive chain connection at the center of the rear roller. A single adjustment of the length of the dipper handle controls the limiting depth of excavation.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—TRUCKS—20

Improved Pedestal Tie Bar Extends Across Truck Pedestal Jaws*

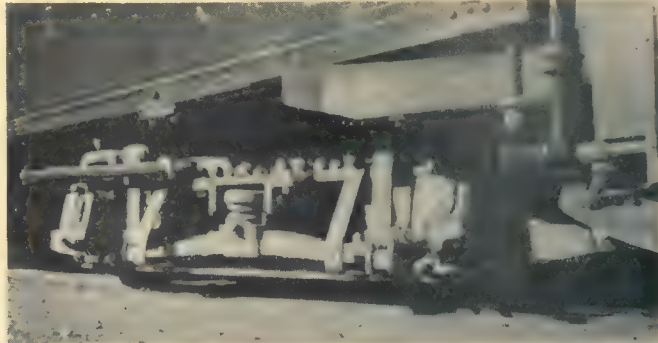
By R. T. CHILES

Master Mechanic Cumberland County Power & Light Company, Portland, Me.

ON CARS of the Cumberland County Power & Light Company equipped with Brill 77-E-1 trucks the pedestal tie bars originally of the bar has been installed which were clamped to the bottom end of the semi-elliptic spring safety angle. It is bolted with countersunk-

head bolts to the bottom end of the semi-elliptic spring safety hanger and extends across both openings of the truck pedestals.

In applying the angle tie bar it was necessary to form an opening by mashing down the top edge of the angle to permit the semi-elliptic spring seat rocker to swing. It was also necessary to notch out the top edge of the angle $\frac{1}{2}$ in. deep by $6\frac{1}{2}$ in. long to clear the bottom side of the journal box.



At left, original arrangement of pedestal tie bar, which is clamped to the bottom end of semi-elliptic spring safety hanger. At right, improved tie bar extending across pedestal jaws

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

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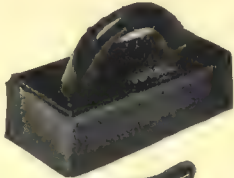


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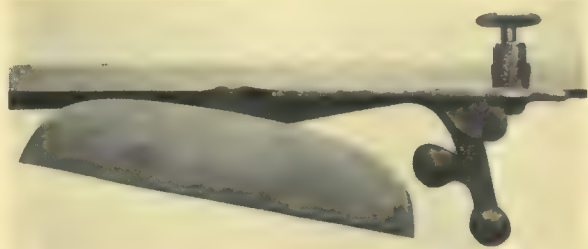
ROLLING STOCK—MISCELLANEOUS—26

Handy Type of Foot Gong Bracket*

BY A. M. LINDSAY

Superintendent of Rolling Stock Montreal
Tramways, Montreal, Canada

REPLACEMENT of a deflecting foot gong or knocker without taking down the bracket is possible with a type of bracket used by the Montreal Tramways. The bracket is made of malleable iron and is fastened to the car underframing by $\frac{1}{4}$ -in. carriage bolts. The gong is fastened to the bracket by a square-headed bolt, the casting being countersunk so that the bolt is held from turning. The nut is inside the gong and can be unscrewed readily when it is desired to remove the gong.



This foot gong bracket provides for removal of gong or knocker without taking down the bracket

The knocker is pivoted on two position from the open end of the its bearing groove a cotter pin arm extensions from the bracket slot. To safeguard against possi- passes through the two bearing ribs and can be slipped into or out of bility of the knocker getting out of outside the knocker shank.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—42

Better Lubrication for Old Type Motors*

BY BENJAMIN H. HALL

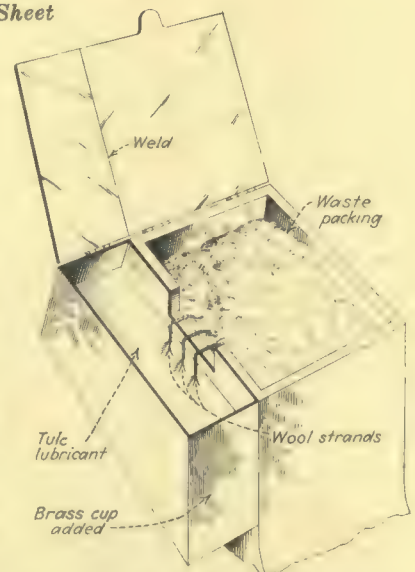
Shop Foreman West Penn Railways,
McKeesport, Pa.

SOME Westinghouse No. 56 railway motors originally arranged for grease lubrication have been changed over to oil and waste lubrication in the shops of the West Penn Railways. Several different methods have been tried, but the one which has proved most satisfactory consists of fastening a $\frac{1}{8}$ -in. rectangular brass cup to the outside end of the bearing housing. This is held in position by two $\frac{1}{4}$ -in. round-head stove bolts. The cups used are $1\frac{1}{8}$ in. x $3\frac{1}{2}$ in. x 4 in. for the pinion end and 1 in. x $3\frac{1}{2}$ in. x 4 in. for the commutator end. The top of the brass cup is flush with the top of the lubrication opening as originally provided in the motor. The stove bolts which fasten the cup to the housing have the heads soldered on the inside of the brass

cup to prevent leaking if the bolts should become loose in service. In order to provide a covering for the new cup a No. 14 gage sheet iron extension is welded to the cover.

The original opening is packed with wool waste so as to fill this and bear on the armature shaft. The new cup is filled with Tule lubricant and this is conducted to the top of the wool waste packing by capillary action through wool strands. There are three of these strands used on the commutator end bearing and six on the pinion end.

To provide space for these wicks to go from the brass cups into the main opening a notch $\frac{1}{8}$ in. deep by $1\frac{1}{2}$ in. wide is cut at the top. A lip from the brass cup extends across this notch over into the original opening and the wicks lay on this



A brass cup added to the side of the original lubricant opening provides for conducting oil to the top of the waste packing

lip. At the pinion end a partition in the center of the lip is provided so that three wicks lay on either side. When installed the cups are filled nearly full and after that scheduled additions are made.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

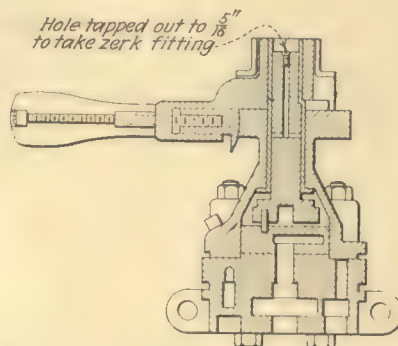
ROLLING STOCK—MISCELLANEOUS—27

Zerk Fitting Used for Lubrication of Brake Valve*

BY H. C. PRESSLER

Master Mechanic Eastern Texas Electric Company, Beaumont, Tex.

FOR lubricating M-28 brake valves the Eastern Texas Electric Company uses Zerk fittings. A hole drilled in the brake valve top is tapped out to take the standard Zerk fitting. A cap screw is used to cover the fitting. This keeps the grease from blowing back into the operator's face and also keeps the top clean, so as to eliminate danger of dirt getting into the valve. It also prevents an accumulation of grease which might injure passengers' clothing.



Construction used for applying Zerk fittings to M-28 brake valve

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—43

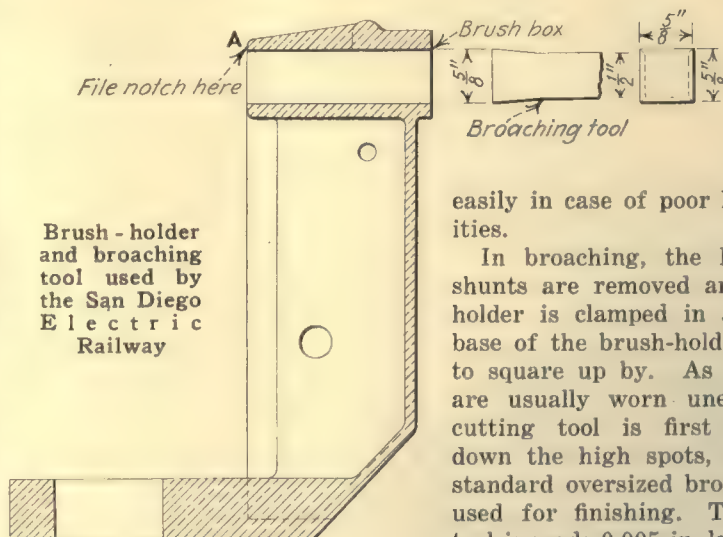
Brush-Holders Broached When Worn*

BY CHARLIE HERMS

General Foreman San Diego Electric Railway, San Diego, Cal.

RAPID wear of brush-holder boxes is caused by sharp particles of sand being sucked into the motors used by the San Diego Electric Railway. Brush-holders are broached out to a size $\frac{1}{8}$ -in. larger than originally, when they become worn and a brush $\frac{1}{8}$ -in. thicker than the original is used. No difficulty has been experienced from the use of the thicker brush. By this method double the life results from brush-holders, and the cost of broaching is very small.

In order to provide for easy identification of brush-holders that have been broached, each holder is marked by filing a good-sized V-shaped notch in the top center of the brush-holder. This notch is large enough so that the inspector can feel it



easily in case of poor lighting facilities.

In broaching, the hammers and shunts are removed and the brush-holder is clamped in a shaper, the base of the brush-holder being used to square up by. As brush-holders are usually worn uneven, a small cutting tool is first used to cut down the high spots, and then the standard oversized broaching tool is used for finishing. The broaching tool is made 0.005 in. larger than the brush to provide desirable clearance.

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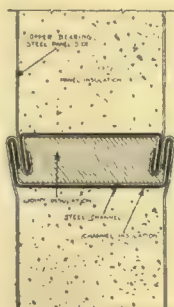
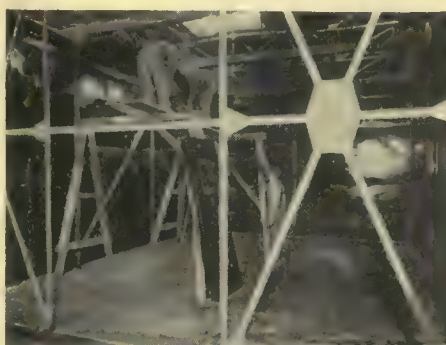
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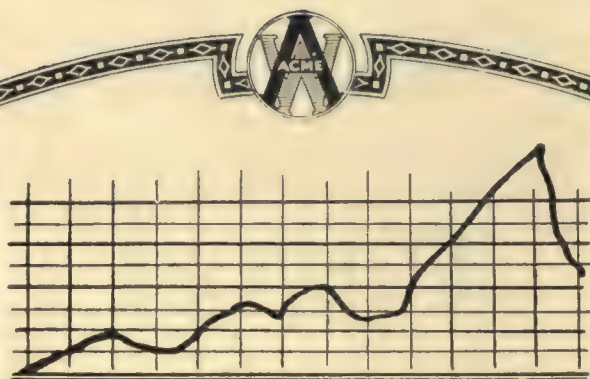
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News of the Industry

Bill to Renew Public Control in Boston

A bill is under discussion in the Massachusetts Legislature for the extension of the public control of the Eastern Massachusetts Street Railway for a period of ten years. The measure is substantially the same in its provisions as the act of 1918 which created the present public control of the road, except that it does not ask for any more financial guarantee by the commonwealth. The road is strong enough now to finance itself. The bill is offered by Mayor Ralph S. Bauer of Lynn. It has been indorsed by the Massachusetts savings banks, which hold Eastern Massachusetts securities.

At the first legislative hearing it developed that the mayors and ex-mayors and chamber of commerce representatives, senators and representatives in practically all the cities and towns served by the Eastern Massachusetts Street Railway are in favor of continuing the public control of the road. They declared, without exception, that service by the company is satisfactory, that the trustees are on most cordial terms with the people and public officials in the communities, and that the general feeling is that the present conditions should not be changed. The physical condition of the road is good and finances are encouraging.

The stockholders are making it known to the legislators that they feel the road should be returned to them at the end of the present ten-year period, which comes next January. They maintain, largely through L. Sherman Adams and Boyd B. Jones, that while the trustees have paid some dividends the common stockholders have received no dividends during the nine years of public control, and so long as they have no guarantee of dividends from the public trustees they desire to have the property returned for private operation. The stockholders maintain also, that if there is to be an extension of public control the period should be less than ten years, and the stockholders should have at least one representative on the board of trustees, and it should be made plain that when the dividend is earned it should be paid, even on the common stock.

The stockholders contend that the prospects of the company were hurt when the public trustees entered into a gentleman's agreement with the New York, New Haven & Hartford Railroad and the Boston & Maine Railroad under which the Eastern Massachusetts ceded to the railroads the right to operate buses between the large cities. That is a field the stockholders would like to see developed by the Eastern Massachusetts Street Railway.

The bill is before the committee on street railways. The public control will terminate at this time, unless the Legislature passes a new control bill which meets with the approval of the security holders.

Federal Court to Act on New York Fare Case

Jurisdiction was assumed on March 15 by the Federal Court over the transit problem in so far as the rate of fare which the Interborough Rapid Transit Company may charge and that company's relations with the city of New York are concerned. The special statutory court of three Federal judges began to hear arguments on the Interborough's application for permission to charge a 7-cent fare pending the final decision by the United States courts as to the amount of fare to which it is legally entitled.

Federal Judge William Bondy ruled that the Federal courts have jurisdiction. He continued the order which Federal Judge Francis A. Winslow issued on Feb. 17 and which stays the action of the New York State courts. In effect this order, which now stands until the statutory court decides whether the company may increase the fare, wipes out three injunction suits begun in the Supreme Court by the city and Transit Commission to enforce the 5-cent fare provision of the contract between the city and the company.

Judge Bondy's decision further provided, however, that the I.R.T. might not raise the fare until and unless the statutory court granted its application.

"And Live"

A WRITER once said, in effect, that whenever any of the great sayings were misquoted it generally results in a weaker word being used. Thus, "A little learning is a dangerous thing" is weakened whenever, as quite commonly happens, the word "learning" is replaced by the word "knowledge."

We ran across an exception the other day, but in this case the new word has been introduced deliberately. "Stop, Look Listen," is a slogan that has proved effective, but we admire the genius of the man who has made it read:

"Stop, Look—and Live."

The amended injunction is not for grade crossings and street intersections alone. It has received the magic touch which transmutes the well-known phrase into something close to poetry.—*Ottawa Electric Railway News.*

Baltimore Fare Question Goes to State Court

The United Railways & Electric Company, Baltimore, Md., has carried its fight for a straight 10-cent fare into Circuit Court No. 2. The company seeks to restrain the Public Service Commission from withholding from the United the right to charge a straight fare of 10 cents and also from charging two fares to Halethorpe, a suburban development. The commission recently granted the company a 9-cent cash fare with three tokens for 25 cents and reduced the number of fares to Halethorpe from two to one. The commission must answer within twenty days. When this is done a date will be set for hearing. The original petition by the United sought a straight 10-cent fare.

The United charges that the company's property is being confiscated in contradiction to the fourteenth amendment of the Constitution, the Maryland bill of rights and the public service law. According to the petition the maximum rate of fare the company is permitted to charge under the commission's orders is grossly inadequate to yield a fair return upon the fair value of its property.

It is also charged that the percentage which the commission found would be the rate of return upon the fair value of the company's property yielded by the fares established by said order was adopted by the commission as a fair rate of return solely for reasons and upon considerations that have no true relation to the fairness of a return, and was a grossly inadequate rate of return to compensate for the use of its property in the public service without confiscation of its property.

The petition says the amount which the commission determined would be a proper annual allowance out of earnings to provide for depreciation and retirement of the company's property used in the public service was grossly inadequate for that purpose and was fixed by the commission upon a basis that had no true relation to the amount required for said purposes, that no allowance was made, in determining the present value of the company's property, upon which the rate of return from the rates established must be calculated, for the net additions to its property since Jan. 1, 1924, and that the commission burdened the company with a substantial loss of revenue by requiring it to abolish the second fare upon its Halethorpe line which further diminished the immediate return upon the company's property.

In concluding the petition states that irreparable damage will be suffered by the company unless a preliminary injunction or restraining order is issued.

New York Unification Bill Introduced

Senator Bernard Dowling introduced the Untermyer bill in the New York Legislature on March 14. It provides for creating a Board of Transit Control for the unification of subway lines in New York City. A joint statement of Senator Downing and Assemblyman Bloch said, in part:

The bill introduced is a mandatory 5-cent fare measure, provided the proposition of unified management makes good. It is written into the law "any such plan of readjustment, and any lease or leases entered into hereunder, unless otherwise determined by the local authority of the city and for such period or periods as it may determine, shall provide for a 5-cent fare for one continuous ride in the same general direction on the respective railroads embraced therein; provided, however, that adequate provision be made through priority of payment out of revenues, the establishment and maintenance of an interest and amortization fund or funds and otherwise for the periodic payment of interest and amortization charges payable by the board under such plan or under such lease or leases."

The transit bill is practically the same as the measure sent to Albany several weeks ago. Only a few minor amendments have been made to it. The Republican leaders announced at the time that they would give it serious consideration and if they could agree on it would have the measure introduced by the majority leaders.

Report of Cincinnati Project Expected Soon

His company is ready to take action at once that will speed up the settlement of the municipality's rapid transit situation, according to Walter A. Draper, president of the Cincinnati Street Railway, Cincinnati, Ohio. In his statement, made as the result of a report presented by a committee to the Cincinnati Association, a semi-public organization, Mr. Draper said in part:

I don't know that anyone can be blamed for delay. In fact, I don't think "blame" is the proper word to use. If there has been delay, it has been due to the consideration of so important a subject. Time has been utilized in getting all the information possible before opening discussion of an operating agreement.

Our company has undertaken an analysis of the Beeler report (an expert's report made some six months ago to the city). I felt that we were justified not only in having our own engineers analyze the Beeler report, but also in having it done by A. L. Drum & Company, Chicago, for two reasons: One is that Mr. Beeler pointed out that the line could be operated without loss only in case a number of things more or less difficult are done, and then only by a very slight margin; the other is, that Mr. Beeler was one of the engineers called in by the city in the development of the lines.

We completed our own preliminary analysis some time ago, and I anticipate that Mr. Drum's report will be ready very shortly.

E. W. Edwards, president of the Rapid Transit Commission, said that as

soon as he got word from the railway that it was ready to discuss the matter of a contract for leasing the rapid transit system, he would call a meeting for the purpose. The leasing, as well as bond issues for completing and equipping the system, would have to be submitted to a vote of the people of the city for ratification. Six million dollars has already been spent on the project, and it is estimated that completion and equipment will cost \$8,000,000 additional, plus \$2,500,000 if it is extended to Fountain Square, the center of the city.

Springfield Host of Three Associations

President Stevens epitomized principles which should guide participation of utilities in civic activities

JUST as busy individuals can take part in civic government with no desire for financial gain but with the certainty that they will have to sacrifice time and money in serving the public, so can the public service company be equally earnest in its citizenship. This is the opinion expressed by R. P. Stevens, president of the American Electric Railway Association, whose personal message to the joint session Wednesday morning, March 15, opened the two-day annual convention of the Illinois State Electric, Gas and Street Railway Associations in Springfield, Ill.

Mr. Stevens could not be present at the meeting and his message was presented by G. W. Welsh, president of the Illinois Electric Railway Association and vice-president of the East St. Louis & Suburban Railway. The remarks of the A.E.R.A. chief executive epitomized the principles which should guide their participation in civic matters. Quoting Mr. Stevens, "The utility is a citizen of its community as large as any individual to whom it renders service. It has a vital interest in everything that affects the community as a whole. It should be a booster, both through the utterances of its officers and through the high quality of the service it renders."

Government ownership was characterized as an attempt to transform the state into a benevolent Santa Claus, by Henry Swift Ives, vice-president of the Casually Information Clearing House, Chicago. He said the "old feudal doctrine that the government should support the people" is having a revival in this country. According to him altogether too many business men and property owners are ardent capitalists when it comes to their own business, but are apt to be just as ardent socialists when it comes to the business of the other fellow.

"There are no problems that can long daunt an industry that has the will to study and the capacity to learn," declared Oscar H. Fogg, president of American Gas Association. Mr. Fogg pointed out the need for fullest cooperation among the utilities if each is to serve to the best advantage and warned that dire days for present man-

agements would come if anything was allowed to interfere with the public utilities' development to meet the needs of the nation.

C. Edwards Thorney, assistant to vice-president of the Chicago, North Shore & Milwaukee Railroad, outlined in the afternoon session the better business campaign in which the 2,000 employees of his company have been engaged for the past two years.

E. E. Soules, manager department of publicity, Illinois Traction System, augmented his paper with the presentation of still film views of advertisements to promote new business used within recent months by midwestern electric railways.

M. E. Hansen, of the Illinois Power & Light Corporation, Decatur, Ill., declared that the trend of motor coach design seemed to be away from the double-deck bus now used in big cities toward the 29- to 40-passenger single-deck bus.

The Springfield Engineers' Club made the conclusion of the first day's session of the convention the occasion for its annual dinner. At this dinner Col. Sidney Story spoke on the American merchant marine.

Council to Proceed with Chicago Subway Plans

Full approval to proceed with the work of drafting ordinance for downtown subway construction in Chicago has been voted to the board of local improvements by the City Council. As passed by the Council the resolution authorizes the board of local improvements to prepare ordinance for one north and south system and one east and west system, after public hearings are conducted, in any streets where property owners are willing to pay for a portion of the cost by special assessment.

According to Michael J. Faherty, president of the board, the first step will be to invite property owners to petition for subways. The board will, meantime, prepare estimates of the cost of construction and will then call a public hearing on the petitions. If the majority agree to the special assessment plan, ordinances will be drawn up and presented to the City Council. Following this Mr. Faherty believes, a test case will probably be taken to the Supreme Court in order to validate the special assessment paper. Once a favorable decision is obtained on this point the board can begin the actual construction.

The procedure contemplated by the resolution passed by the Council is based on the theory that subways can be built under the local improvements acts just as sewers are dug and streets widened—without additional legislation. Local traction officials, however, maintain that the city needs more power to levy special assessments for subway building. One of the set of five transit enabling bills prepared by the city, consideration of which was recently deferred until after the primaries in April, proposed to give the city complete power to finance subways in this manner.

No 10-Cent Fare in Kansas City

Powell C. Groner, president of the Kansas City Public Service Company, Kansas City, Mo., has denied that the company will soon apply for an increase in electric railway fare to 10 cents. Statements had been published to the effect that the company contemplated asking for an increase of fares in June. Mr. Groner said:

I desire to state officially and unequivocally that no such application ever has been considered, discussed or contemplated. The company is proceeding in good faith to carry out to the letter its franchise agreement with Kansas City and expects to continue to do so.

If future conditions should warrant an increase in fares, this company will lay the facts before the City Council at the time, feeling confident that justice will be done all parties, but no such action is now being contemplated.

At the time the company received its franchise nearly two years ago the City Council was promised that no fare increase would be asked.

Continuance of Transfer Charge Authorized in Indianapolis

An order continuing the 2-cent transfer fee now being charged by the Indianapolis Street Railway on its lines in Indianapolis, Ind., was continued by the Indiana Public Service Commission on Feb. 27. The order, written by Commissioner John W. McCardle, provides that the charge shall be continued until further order of the commission.

Negotiations Opened Up in Toledo

The ultimatum of the new city administration at Toledo, Ohio, to the Community Traction Company, to pay a back paving bill of \$187,500 with interest from February, 1921, by March 5, has been suspended pending settlement of a new power rate which under terms of the present agreement between the railway and the Toledo Edison Company will be retroactive to July, 1924. Mayor W. T. Jackson and Law Director George W. Ritter have taken the stand that no new negotiations looking toward extension of the present franchise and other things desired by the company will be started until the present Milner ordinance provisions have been complied with and controversial issues settled.

At a recent conference with the Mayor spokesmen indicated that the company was in no position to pay the claim for paving at the present time without resort, at least, to increasing fares; that it would be unable to go ahead with any paving program this summer if forced to pay; and that there were numerous other difficulties such as independent bus competition which, if remedied, might enable it to pay. During the conference the matter of new franchise and the previous nego-

tiations were discussed. Company attorneys took the stand that no scaling down of capital value could be countenanced, but city spokesmen took the position that bond owners might be induced to bring in new money to build up the property and restore the value behind the bonds.

Negotiations to settle the power rate will be undertaken at once. Some other minor issues will also be settled following the power rate determination. Mayor Jackson indicated that he was willing to go through with a real settlement if the company would clean up points now at issue in the Milner plan operations.

Old Cars at Worcester to Be Burned

More than 100 cars of the Worcester Consolidated Street Railway, Worcester, Mass., which is rapidly disposing of all its worn-out rolling stock, are doomed to be burned within the next few months. The officials plan to burn two or three a day after the metal in them has been reclaimed. Some of the cars are 30 years old—many of the old single-truck type.

New one-man and two-man cars have gradually replaced many of the old cars, especially under the rehabilitation program of the New York, New Haven & Hartford Railroad.

No-Cruising Regulation Effective in Philadelphia

INTERESTING statistics are shown by a check recently completed by the traffic department of the Philadelphia Rapid Transit Company, Philadelphia, Pa., for the purpose of learning what effect the no-cruising regulation was exerting on the number of empty cabs in movement in the downtown streets. The results of this check, made on Chestnut Street between Juniper and Thirteenth after the beginning of no-cruising, were compared with those of a similar check made at the same season of the year, but before the new regulation went into effect.

A year ago, in spite of the smaller number of cabs, 1,877 empty cabs of all companies passed along this section of Chestnut Street between the hours of 9 a.m. and 6:30 p.m., an average of one empty cab every eighteen seconds. The figures of the recent check show that this number diminished from 1,877 to 630, an average of one empty cab every 54 seconds. This is an average reduction for all cab companies of 66 per cent. Figures for Yellow Cab alone show their reduction to be 69 per cent, three points better than the average figure. This was in the face of the fact that cab companies increased their fleets during the past year.

H. P. Savage in New Rôle

Howard P. Savage, past national commander of the American Legion and assistant general manager of the Chicago, North Shore & Milwaukee Railroad, has entered the race for delegate to the national Republican convention from the tenth congressional district in Illinois.

The petition for the nomination of Mr. Savage was filed by friends over his objection that "business and politics won't mix." He subsequently sent a letter to the secretary of state asking that the petition be withdrawn, but was informed that his name had already been certified and that it was too late to withdraw.

Mr. Savage is identified with the so-called Lowden-Deneen-Emerson Republican faction.

Kansas City Company Drops Objections to New Viaduct

The Kansas City Public Service Company has withdrawn objections to the early construction of a viaduct on Winner Road over the railroad tracks and the Blue River in Sheffield, and will join the city in overcoming the opposition of others, making prospects for the building of the viaduct considerably brighter. As planned the viaduct would be 3,513 ft. long. The total cost, apportioned among six agencies, is estimated at \$1,900,000. Under the commission's apportionment, the share of the cost to the Kansas City Public Service Company would amount to \$255,360. The three railroads and the Sheffield Steel Corporation have appealed the apportionment of the Public Service Commission.

Omission of Year from Date Misleading

The meeting with the Mayor, Common Council and interested department heads at Detroit, Mich., referred to in the *ELECTRIC RAILWAY JOURNAL* for Feb. 25, 1928, page 334, under the caption "More Moves to Speed Up Traffic in Detroit" was held on Jan. 24, 1927, not 1928, as a typographical omission made it appear. As the story stated, and as is generally known, the combined express street car and local bus service was placed in service on East Jefferson Avenue under date of Sept. 18, 1927. The date on the bulletin of the police department, reproduced as part of the article, was correct as given, namely, Jan. 26, 1928.

Atlanta School Ticket Sale Rearranged

Certificates are no longer needed in purchasing school tickets in Atlanta, Ga. The certificates signed by the principal or teacher before the car tickets could be sold to the children may now be purchased without identification and in any quantity at the rate

of twenty tickets for \$1. The new arrangements were made to eliminate the inconvenience to principals in having to fill out the certificates and the inconvenience to parents in being able to purchase only \$1 worth of tickets at one time.

Dallas Fare Plea Withdrawn Without Prejudice

Formal steps to end the public hearing on the application of the Dallas Railway & Terminal Company, Dallas, Tex., for a 10-cent cash, 7-cent token fare were taken recently when Joe Worsham, general attorney for the company, read a statement for President John W. Carpenter, formally withdrawing the application at this time without prejudice.

Commissioner Clarence Parker moved that the statement be accepted. This the City Commission did by unanimous vote. After publicly thanking the company for its spirit in taking this action, Mayor Burt paid tribute to John W. Everman, supervisor of public utilities, who will be reappointed to that post.

Seattle Turns Down Mayor Landes

Bertha K. Landes, elected two years ago as Mayor of Seattle, by a majority of more than 6,000, lost re-election on March 13 by a majority of more than 19,000. It will mean her retirement on June 4. Her successful opponent is Frank E. Edwards, politically unknown. Mrs. Landes had taken an active interest in the municipal railway workings and had brought an intelligent understanding to the problems of that department. Recently, she stated that for the first time in the nine years the city owned the system "the future really looks hopeful" and the "railway is making substantial progress toward financial stability." She accompanied her statement with comparative revenue and expense figures for 1927 and 1926.

High-Speed Lines from Outlying Philadelphia Suggested

Proposals submitted by the Transit Department at Philadelphia to the City Council suggest high-speed lines from eastern Germantown and Chestnut Hill, Oak Lane and the wide residential section of the northeast feeding into the northern terminal of the Broad Street subway. At this time they await consideration by the transportation committee.

In its report the Transit Department laid particular emphasis on the proposed route through the northeast. The cost of this extension was estimated at from \$5,400,000 to \$43,000,000, according to the type of construction. Estimates for the Oak Lane and Chestnut Hill lines were lacking, but both would be shorter than the northeast extension and, therefore, less expensive.

Recent Bus Developments

Louisville Bus Bill Wins Unanimous Approval

With an amendment calling for a 10-cent bus fare for one year the bus franchise bill of Mayor Harrison was passed unanimously by the lower board of the General Council of Louisville, Ky., on March 13. It now goes before the Board of Aldermen and the next session of the Council, to be held March 20.

The earlier proposal for this ordinance insured a straight 7-cent fare for bus and street cars with interchangeable transfers from rail to motor and half fare for children during the remainder of 1928.

John L. Awtry, Councilman and a member of the revision committee, made the announcement that the committee had considered the bill and approved it with the addition of one amendment. That reads as follows:

The holder of this franchise may charge and collect toll during the first year of operations hereunder at a rate not exceeding 10 cents for each passenger carried within the city limits, with free transfers between bus lines in the making of single continuous trip. Transportation of school children shall be furnished at one-half fare and to policemen, firemen and park guards, when in uniform, free.

Provided, first, that if this franchise be acquired by a person or corporation operating in Louisville, a system of electrically propelled street cars running on rails, or by a subsidiary of such corporation, then such person or corporation shall furnish the free and reduced fare transportation hereinbefore set out, in addition, shall give and receive transfers for the making of a single continuous trip within the city limits upon terms as follows:

From bus line to bus line, and from bus line to electric car line, free; and from electric car line to bus line not for more than the differential between electric car fare and bus fare. The bus fare for the first year of operation shall not exceed 10 cents, and shall thereafter be controlled in the same manner and upon the same principle as the electric car fare, and

Provided, secondly, that by whomsoever the franchise may be acquired, in the adjustment of bus fare, electric car fare, and for transfer rules and charges, the rate or rates for service shall be such as to yield to the holder hereof a reasonable return upon the fair value of its entire and combined properties used and useful, employed in its city transportation service.

"Good Will" Tour in Virginia

Fifty members of the Virginia State Legislature, now in session at Richmond, were the guests of the Virginia Electric & Power Company Feb. 22 on a 100-mile bus trip to Alexandria, Va., where they attended elaborate ceremonies in honor of George Washington's birthday. President Coolidge was the guest of honor. The party was accommodated in the "Virginia" and

"North Carolina," two of the company's de luxe touring units, which are elaborately finished in the colors of the two states.

Coach Lines Proposed for Santa Ana

The Pacific Electric Railway, Los Angeles, Cal., has applied to the Railroad Commission for a certificate to operate coach lines in Santa Ana.

Traffic Growth Provides for New Bus Service in Vancouver

A new bus was recently ordered by the British Columbia Electric Railway, Vancouver, B. C., for the Grandview highway run. The company refused to consider a request for extension of the railway system into the district served by Grandview, and agreed to place the extra bus in operation to meet a condition resulting from a growth in traffic. Half the loss on the operation of buses on this route is paid by the city.

Extra Service in Virginia

Additional transportation service will be furnished Hopewell, Va., citizens under a plan now being perfected by the Petersburg-Hopewell & City Point Railway. A bus has been procured and will be ready for service as soon as details can be arranged and permission obtained from the city.

Illinois Petitions Heard

Hearings on the recent application of the Elgin, Belvedere & Rockford Railway for a certificate to operate a passenger coach line between Rockford and Rochelle, Ill., were held in Chicago on March 13 by the Illinois Commerce Commission. The application of the Northern Illinois Service Company for a local permit for bus service connecting Rockford, Rochelle and Mendota, Ill., was consolidated with the Elgin petition and considered jointly.

Feeder Service in Chicago Extended

Recognizing petitions of more than a dozen local improvement and civic organizations, the City Council of Chicago recently gave its approval to eight new feeder bus lines to be established by the Chicago Surface Lines on the northwest side of the city. Two routes have already been approved by the Illinois Commerce Commission. Coaches of the Chicago Surface Lines have been operating in feeder service over a portion of the Diversey Avenue route for the past six months.

Financial and Corporate

Trustee Acts Against Grand Haven Road

On application of the Guaranty Trust Company, of New York, trustees under the terms of the indenture securing certain bonds of the Grand Rapids, Grand Haven & Muskegon Railway, District Judge Raymond on March 6 signed an order to show cause why the operation of electric cars over the interurban should not be discontinued. It is proposed to increase the operation of buses over the route which parallels the interurban right-of-way.

The Grand Rapids Trust Company is receiver for the railway and the mortgage under which the Guaranty Trust Company acts as trustee secures an issue of first mortgage bonds amounting to \$1,500,000, of which interest and principal payments are claimed due.

The railway completed its first year's operation under receivership on July 31, 1927. Its losses during that period were \$27,768, exclusive of interest on bonds. These losses have continued, it was explained.

Intervention Right to Chicago Certificate Holders

Owners of series 1 certificates of the Chicago Railways on March 6 won the right to intervene in the bankruptcy and foreclosure proceedings now pending against the company.

The victory, limited to bare intervention, was won when the United States Circuit Court of Appeals ordered the issuance of a peremptory writ of mandamus, directing the U. S. District Court to grant permission to Orville E. Babcock, representing a protective committee of series 1 certificate holders, to file an intervening petition.

The plan behind the intervention proposal is said to be that purchasers of the certificates were guaranteed an 8 per cent cumulative return. They are seeking a share in the surplus of \$6,000,000 now in the treasury of the Chicago Railways Company.

Approval of Terms of Cab Purchase Sought by P. R. T.

The Philadelphia Rapid Transit Company, Philadelphia, Pa., has agreed to pay \$1,825,000 for the Quaker Cab Company and three suburban bus lines. This was disclosed in a petition filed by the railway with the Public Service Commission for approval of the purchase of the four carriers. The proposed deal includes the purchase of 5,000 shares of the outstanding stock in the Quaker City Cabs, Inc.; 4,510 shares of the Montgomery Bus Company, Inc.; 1,000 shares of the Philadelphia Suburban Transit Company, and 200 shares of the Doylestown & Easton Motorcoach

Company. What price is to be paid for each of these four properties was not disclosed, as the four are joined together in one sale. Action on the matter has been postponed pending completion of an appraisal of the four properties.

Brazilian Utility Is Sold

The South American Power Company, a subsidiary of American & Foreign Power Company, Inc., has acquired control of the South Brazilian Railways, Ltd., from the International Light & Power Company, Ltd.

Merger Hearings Concluded

Railways in Washington willing to accept \$50,000,000 valuation with 7 per cent return although found value is \$62,000,000 without bus allowance

MARCH 13 saw the close of the hearings at Washington, D. C., started in February with the purpose in mind of bringing about a consolidation of the Capitol Traction Company, the railway properties of the Washington Railway & Electric Company and the Washington Rapid Transit Company, operating the local bus lines. The plan in detail, previously adopted by the directorates of the several companies, was formally laid before the Public Utilities Commission on Feb. 15, with a petition for its approval by that body, with favorable recommendation to Congress for the legislation necessary to effect the change.

UNIFICATION OF THREE SYSTEMS PLANNED

The project involves the unification of the three corporations, with one of them maintaining a separate existence for stockholding purposes, with a capitalization of \$52,400,000 and a valuation of \$50,000,000 for rate-making purposes, the new company stipulating the right to earn a return of 7 per cent. This valuation of \$50,000,000 is regarded by the companies to be a considerable concession, since the Capitol Traction officials hold to a value of \$26,000,000 for that property alone. A conservative value for both railways has been placed by company officials at \$62,000,000.

At the outset of the proceeding William McK. Clayton, chairman of the public utilities committee of the Federation of Citizens' Associations, made a motion that provisions in the merger agreement referring to the bus company be stricken from the petition, but objections by William Gibbs McAdoo, chief legal counsel for Harley P. Wilson, principal owner of the Washington Rapid Transit Company, and S. R.

New Director in Norristown

Thomas Newhall recently resigned as a director of the Philadelphia & Western Railway, Norristown, Pa. He is succeeded by Edgar C. Felton.

Sale of Morris County Traction Approved by Commission

The State Board of Public Utility Commissioners of New Jersey on March 10 approved sale of property of the bankrupt Morris County Traction Company, Morristown, N. J., to George R. Hann for \$280,000. The sale was negotiated by Receivers Joseph P. Tumulty and Joseph K. Choate. The Public Service Co-ordinated Transport will operate buses over the routes formerly covered by the company's lines.

Bowen of the legal staff of the Washington Railway & Electric Company were sustained by John W. Childress, chairman of the commission.

The demand for a merger has been expressed by various interests for the last twenty years and in order to meet that demand several previous attempts were made to bring about a consolidation. They failed because the parties thereto could not come to terms. The demand for a merger has been more insistent in the last few years and as a result the present plan was drawn up.

At one stage of the proceeding W. F. Ham, president of the Washington Railway & Electric Company, said:

We have accepted the \$50,000,000 not because we are not, in our judgment, entitled to a larger valuation, but upon the rather insistent demands of Mr. Wilson for a merger even if accomplished at some sacrifice to the companies and in the belief that the commission could easily satisfy itself that the property was worth in excess of \$50,000,000. We have in the past been of the opinion that the value should be determined under the provisions of the public utility act.

He also is quoted as having said:

It would further appear that no one can question the reasonableness of a 7 per cent return. The customary rate is 8 per cent. There are very few instances where courts or commissions have fixed a rate of return as low as 7 per cent. In a list of recent court decisions covering 23 cases, many of them United States Supreme Court cases, there is one instance of a 7 per cent return three of a 7½ per cent return, and nineteen of an 8 per cent.

But the question before this commission is not whether these figures are exact in every detail, but are such as to enable them to satisfy their minds that the value of this new transit property is at least \$50,000,000. I cannot see how it is possible for any one

properly informed, to have any doubt upon this matter. You will have noticed that in this computation no allowance is made for the value of property of the Washington Rapid Transit Company, included in the merger.

REVIEW OF VALUATION CASES

About a year after the passage of the Public Utilities Act in 1913, the Public Utilities Commission proceeded to value the property of all the public utilities subject to jurisdiction. The valuation of the Potomac Electric Power Company having been determined by the commission in 1917, two years in advance of the valuations of the Capital Traction Company and the Washington Railway & Electric Company, it was understood by all parties concerned that the Potomac case should be considered the key case. It was taken first to the Supreme Court of the District of Columbia, with a decision favorable to the commission; then to the Court of Appeals of the District of Columbia, with a decision favorable to the company; then to the Supreme Court of the United States, which refused to take jurisdiction, thereby leaving the decision of the Court of Appeals of the District of Columbia final, and the principles therein outlined binding in other cases pending before the courts. Final settlement of this case was reached by agreement between the commission and the company

Dec. 31, 1924, and confirmed by the Supreme Court of the District of Columbia.

With the Potomac case out of the way the Capital Traction Company carried on its appeal, finally reaching a conclusion by decree of the Court of Appeals of the District of Columbia definitely fixing the value of its property, Jan. 1, 1925, as \$25,756,880. The Washington Railway & Electric Company had not proceeded with its case, awaiting determination of the Capital Traction case.

OTHER CASE DEFERRED

Some time after the determination of the Capital Traction case representatives of the Washington Railway & Electric Company conferred with the Public Utilities Commission, at which it was suggested the company figure its value according to the principles laid down in the Capital Traction case and submit these figures to the commission for their accountants to re-check. This was done.

The value of the Capital Traction Company, on Jan. 1, 1925, was \$25,756,880, with additions of \$267,769 since that date to make a total value within the District of Columbia of \$26,024,559, and adding the value of properties in Maryland, \$402,731, makes a total of \$26,427,290.

Applying the principles of the Capital Traction case the Washington Railway & Electric Company had a value within the District of Columbia on Jan. 1, 1925, of \$30,385,263, adding to this additions since that date of \$955,401 makes a total value of the Washington Railway & Electric property within the District of Columbia as of Dec. 31, 1927, of \$31,340,664, and adding the value of its property in Maryland, \$4,360,493, makes a total value of \$35,701,157. The two railroads therefore have a total valuation of \$62,128,447.

At the concluding hearing President Hanna of the Capital Traction said:

The only reason our company has not heretofore applied for a higher fare is that we have awaited the outcome of merger negotiations. Last September our board of directors was authorized to apply for a rate increase. We have not abandoned the idea.

If there is no merger we will apply for increased fare. To obtain a fair return on the \$21,000,000 to \$22,000,000 of the \$50,000,000 valuation which will represent our part, will still require an increased fare if there is a merger.

SOME MATTERS FOR COMMISSION'S DETERMINATION

Mr. Hanna added that other questions than valuation and rates, including character of service to be rendered, reduced fares for school children and labor policy, were none of them properly to be discussed in the merger hearing. He said they were matters for the board of directors of the new company and the public utilities commission to take up after a merger has been effected.

Cognizance Taken of the Investment Value of Electric Railways

HALSEY, STUART & COMPANY, INC., New York, specialists in public utility securities, all of whose literature bears the imprint "The strength of the Utilities" have just completed an advertising campaign in national media in which 24 advertisements were used to tell, in language readily understandable, something of the scope and importance of the utilities—their far-reaching contribution to social and economic progress, and their remarkable growth in recent years.

The ads were in nowise intended to be a comprehensive report or study, but the discussions do, in a measure, interpret the utilities from the point of view of both public interest and business enterprise. As the company itself has expressed the matter it is its "hope that they (the advertisements) may help further to promote the public good which the utilities now enjoy, and increase the widespread confidence in well established utilities as a field for investment." The ads have



Electric Railways Still Remain the Great Mass Transportation Agency

IN the large American city, there is no means of transporting the thousands of people so quickly, so safely, and so cheaply as the street railways, elevated lines or subways. Despite the millions of privately owned automobiles and the growing use of motor busses, the electric railways of the United States carried approximately sixteen billion passengers in 1927. Three out of every four rides in any kind of a vehicle are said to be trolley rides.

The onset of the war, and the period of rising costs which followed, taxed their administrative and financial resources almost to the breaking point—in some cases, to that point—but with the characteristic resourcefulness of private enterprise in America, they set about to cope with the new conditions. For years the five-cent fare had been general. It had become fixed in public consciousness. It was hard to see at first that the cost of transporta-

tion in street cars had increased along with other costs, that it had but followed the upward tendency of all commodities. Sound consideration of all problems involved has permitted an adjustment of rates upward—at present the average fare being 7.5 cents. This has enabled metropolitan electric railways, generally, to maintain a high standard of service in spite of increasing competition.

Allowed to develop normally, under sound business management subject to judicious regulation, the electric railways have shown themselves to be the most effective method of handling metropolitan traffic. Indeed, a glance into the future reveals them as the center of the city transportation system, with bus lines as feeders, cooperating instead of competing. A natural corollary of this is an improved financial status of the industry and an increasing demand for sound electric railway securities.



INVESTORS who desire more specific information about the investment value of Public Utility Bonds, will find it in this booklet. It is an authoritative treatment of the subject, based on the most up-to-date figures and figures of the industry. Request booklet.

HALSEY, STUART & CO.

INCORPORATED
CHICAGO 361 South La Salle Street NEW YORK 100 West Wall Street
PHILADELPHIA 121 South Fifth Street DETROIT 161 Grand Street CLEVELAND 911 Euclid Avenue
ST. LOUIS 315 North Fourth Street BOSTON 15 Devonshire Street PITTSBURGH 105 Fifth Avenue
MINNEAPOLIS 315 West Fifth Street KANSAS CITY 101 Grand Avenue, Kansas

Telling the investor about the electric railways

been reprinted in booklet form. They are exceedingly interesting, both as to text and illustrations.

\$279,075 Received from Ottawa Electric

In submitting their fourteenth annual report covering the year ended Dec. 31, 1927, the directors of the Ottawa Traction Company, Ottawa, Ont., report that \$279,075 was received from the Ottawa Electric Railway during the year. With this amount was paid the usual quarterly dividends of 1 per cent, and a bonus of 1 per cent.

Twenty new modern P.A.Y.E. cars were purchased during the year and are now in operation. Several track jobs were renewed with heavy steel.

Will Hear Case of Maine Abandonments

A hearing is scheduled for April 10 on the proposal of the Cumberland County Power & Light Company, Portland, Me., which operates the Portland Street Railway under lease, to abandon several unprofitable railway lines. Opposing patrons are planning to present their side of the question to the Public Utilities Commission. An attempt will be made to restrain any order allowing abandonment with no replacement guaranteed. The operating company claims a heavy deficit has been accumulated due to operating these non-paying lines.

Shareholders of Nova Scotia Tramways Submit New Plan

Shareholders of the Nova Scotia Tramways & Power Company, Limited, Halifax, Canada, dissenting from the company's proposed refinancing program, have unanimously adopted the proposal of Edmund F. Stevens, objecting to any disturbance of the present bond issue. By this means it is claimed the proposed refinancing can be accomplished at practically no cost to the shareholders.

It was pointed out that the time was too short for any concerted action in the matter, but that the shareholders would strengthen their position if they registered a complaint with the company. This committee put forward its arguments and plans to the management of the company and stated, if, after inquiry, any change of policy was decided upon another meeting of the shareholders would be called to discuss the question, before presenting the case.

A statement as to the management's proposed plan, and the program adopted by the meeting presented the new capital structure in the management's refinancing scheme as follows:

First Mortgage 5 per cent bonds.....	\$3,500,000
Cumulative preferred 6 per cent stock....	750,000
No par common stock, 52,013 at 30.....	960,390
No par common stock, 2,510 at 30.....	75,300
Total.....	\$5,285,690

In place of this it was suggested by the meeting that the present bonded indebtedness be undisturbed, and the capital structure be as follows:

First mortgage 5's.....	\$2,250,000
General mortgage 7's.....	1,432,500
No par common stock, 2,510 at 30.....	75,300
No par common stock, 32,013 at 30.....	960,390
Total.....	\$4,718,190
(In treasury, no par common stock 5,477; Total, 40,000.)	

Comparing the present capital structure with that proposed by the company it was pointed out that the interest charges on old securities total \$212,775 as compared with a total of \$220,000 for interest on the new securities as proposed in the refinancing scheme, an annual difference of only \$7,225.

Montreal Distributes Lost Ticket Fund

The City Council of Montreal, Quebec, Canada, has approved an arrangement under which the city and the Montreal Tramways will distribute a fund of \$1,165,000, now in the hands of the company which represents lost or unused tramway tickets.

The arrangement, will be made subject to approval by the Montreal Tramways Commission. It provides that \$500,000 of that amount shall remain with the company as a permanent fund against tickets lost or unused. Of the remaining \$665,000, 50 per cent, or \$332,500, will go to the fund destined ultimately to reduction of local fares; 30 per cent, or \$199,500, will go to the city and will be used for parks and play-

grounds, and the remaining 20 per cent will go to the company as profits.

For ten years, now, this question of the fund has been actively before the administrators of the city. At the time the new tramways contract was signed in 1916, no clause governing disposal of the sums coming from unused or lost tramway tickets was put into the agreement principally because the fund was negligible when the contract was under discussion. As years went by, however, the fund has mounted until now it stands at \$1,165,000.

Results in Denver Before and After Allowing Depreciation

A report issued on the results of 1927 operation by the Denver Tramway, Denver, Col., showed \$4.60 per share was earned on the preferred stock after allowing for depreciation. According to the *Denver Post* by figuring the net profit for the two years on the same basis a balance of \$9.46 a share was earned in 1927, available for the preferred stock before allowing for depreciation. Due to a change in the method of bookkeeping the earnings of the company were reported at less than half as much as shown in 1926, but an analysis of the statement discloses a

\$982,164, a decline of only \$29,212 from 1926.

The 1927 income statement as issued by the company, together with the revised statement used in the comparative analysis, and the 1926 statement accompany this account.

Judgment in St. Louis Satisfied

St. Louis, Mo., through Associate City Counselor Dolan on March 1 acknowledged in the St. Louis Circuit Court satisfaction of the \$2,431,868 mill tax judgment it obtained against the now defunct United Railways. The city accepted 16,212 shares of preferred stock issued by the St. Louis Public Service Company, the successor to the United Railways and foreclosure and reorganization, and \$28,371 in cash, representing a 7 per cent dividend for the last quarter of 1927 in full settlement of the old judgment.

Capital Stock Tax Suit Lost in Boston

The Boston Elevated Railway, Boston, Mass., lost in its suits to recover the capital stock tax which it paid to the federal government during the first

INCOME ACCOUNT OF DENVER TRAMWAY AND DENVER & INTERMOUNTAIN R.R.

	Company Statement 1927	Revised Statement 1927	Statement 1926
Total operating revenue.....	\$4,390,016	\$4,390,016	\$4,565,251
Operating expenses.....	*\$2,940,084	\$2,440,084	\$2,452,131
Taxes.....	523,460	523,460	543,029
Total operating exp. and taxes.....	\$3,463,544	\$2,963,544	\$2,995,160
Net operating income.....	926,471	1,426,471	1,570,091
Miscellaneous income.....	41,413	41,413	54,498
Gross income less operating expenses and taxes.....	\$967,884	\$1,467,884	\$1,624,589
Interest on underlying bonds.....	207,064	207,064	249,959
Balance.....	\$760,060	\$1,260,060	\$1,374,630
Interest on general and refunding bonds.....	322,100	322,160	322,175
Balance.....	\$437,964	\$937,064	\$1,052,455
Net profit and loss credit less amortization of discount on funded debt..	44,200	44,200	41,071
Balance for dividend requirements on preferred stock and depreciation	\$482,164	\$982,164	\$1,011,383

* Includes depreciation.

slight difference. The discrepancy occurs through the charging off of the depreciation item, understood to be \$500,000, before making allowance for bond interest in the 1927 report, whereas this item had previously been deducted from the net profit figure, after all other expenses.

Using the 1926 method of figuring, gross operating income, less expenses and taxes, would be \$1,467,884 for 1927, compared with \$1,624,258 the preceding year. Interest on the underlying bonds was earned more than seven times, a showing even better than was made in 1926, as the bonded debt was smaller than in 1927. Interest on the general and refunding bonds was earned almost four times in 1927, compared with about 4.25 times in the preceding year. Balance available for preferred stock dividends and depreciation was

four years of public trusteeship, according to a recent decision of Judge Morton in the U. S. District Court. The suits for recovery were based on the contention that while the road was under public control it was not taxable by the federal government under the capital stock tax law. Approximately \$50,000 in taxes, which have been paid under protest, are involved in the suits.

J. B. Hollister a Cincinnati Director

John B. Hollister, attorney, was elected to the board of directors of the Cincinnati Street Railway, Cincinnati, Ohio, at the annual meeting of stockholders held recently. He is the only new director. Mr. Hollister succeeds the late Albert J. Becht.

Personal Items

Appointments on Illinois Traction System

H. A. Tuohy, assistant traffic manager, has been appointed acting freight traffic manager in charge of all freight matter.

W. H. Wylie, who has been traffic manager, is retiring from that position, but will continue with the company as special traffic representative.

E. E. Kester, assistant traffic manager, continues in charge of all passenger traffic matters.

These changes in the Springfield office were announced recently by D. W. Snyder, vice-president of the Illinois Traction System.

W. W. Kennedy New Assistant in Birmingham

Walter W. Kennedy has been appointed assistant to J. S. Pevear, vice-president and general manager of the Birmingham Electric Company, Birmingham, Ala. He has been an employee in the executive department since 1925. Prior to his affiliation with the Birmingham Electric Company, he practiced law with the firm of Bradley, Baldwin, All & White. He was commissioned an officer in the United States Army during the World War and has served two terms as president of the Junior Chamber of Commerce.

Mr. Kennedy was born in Birmingham. He was graduated from the University of Alabama as an L.L.B.

R. W. Kelley Superintendent at Ottumwa

R. W. Kelley has been appointed superintendent of transportation of the Ottumwa Street Railway and of the bus system of the Iowa Southern Utilities Company. He was assistant superintendent of transportation in Burlington and has extensive training in both bus and railway operation. Mr. Kelley succeeds O. E. Steiner, who has resigned after eighteen years of service.

Changes in Winnipeg

Promotions and changes on the Winnipeg Electric Company, Winnipeg, Canada, are as follows:

A. E. Parker, formerly managing secretary of the Winnipeg Board of Trade, has been appointed assistant to the president of Winnipeg Electric Company, in charge of public relations and publicity, effective March 1.

Lawrence Palk, who heretofore occupied the position of assistant to the president and secretary of the company, has been appointed assistant general manager, in charge of executive matters. He continues as secretary.

C. H. Dahl, who served as assistant general manager, had his title changed to assistant general manager in charge of operation, effective March 1.

H. C. Howard, who has been publicity manager for a number of years, has left the company's service.

John Hurley, a local newspaper man, has been appointed publicity manager, reporting to Mr. Parker.

J. A. Nilan Manager at Poughkeepsie

J. A. Nilan has recently been appointed manager of the Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y. Mr. Nilan was con-



J. A. Nilan

nected with the New York Telephone Company and Brooklyn Standard Union from 1906 to 1907 as junior accountant and from there he entered the employ of the Central Hudson Gas & Electric Company, Poughkeepsie, N. Y. In this work he was engaged from 1907 to 1909.

In the last-mentioned year Mr. Nilan accepted a position with the Poughkeepsie & Wappingers Falls Railway under the late Capt. J. W. Hinkley, Jr., who was then the president and manager of the company. He was appointed auditor in 1913 and assistant manager in July, 1927. The Poughkeepsie & Wappingers Falls Railway operates 20 miles of line. It is being operated by Hemphill & Wells, engineers, 43 Cedar Street, New York City.

Mr. Nilan was born on March 22, 1884. He was graduated from Eastman Business School, Poughkeepsie, N. Y.

A. C. Baker Succeeds His Father at Birmingham

Arthur C. Baker has been recommended by the Birmingham Corporation Tramways Committee to be general manager of the Birmingham Tramways, Birmingham, England, succeeding his father, Alfred Baker, who is retiring.

The new manager has been through a long and exhaustive experience in engineering. Since 1920 he has been chief engineer of the Birmingham Tramways. The Municipal Tramways & Transport Association last year awarded him first prize for an essay on tramway engineering.

W. W. Trench Succeeds M. F. Westover

Myron F. Westover, secretary of the General Electric Company for the past 34 years, retired on March 1 and William W. Trench, assistant secretary, has been elected by the board of directors to succeed him.

Mr. Westover has been actively identified with the electrical industry for 40 years, his first position being secretary to the late Charles A. Coffin, then treasurer and manager of the Thomson-Houston Electric Company. He was associated with Mr. Coffin until Mr. Coffin's death in 1926.

Mr. Trench, the new secretary, is a native of Staten Island. He is 36 years of age, a graduate of St. Lawrence University and the Brooklyn Law School and was admitted to the bar in 1916.

JOHN ALDORTH, general manager of the Nottingham Corporation Tramways, England, has resigned after 30 years' service with the city in that position. The Tramways Committee has expressed its high appreciation of Mr. Aldorth's services, and proposed that he be retained as a consultant.

Obituary

SAMUEL P. GOULD, for eighteen years assistant secretary of the Selden Motor Truck Company, Rochester, N. Y., died recently at his Rochester home. Mr. Gould was widely known in the automotive industry in which he was a pioneer worker. It was on land owned by Mr. Gould that the Selden Motor Company plant was built. He was the company's first secretary.

HENRY A. ROBINSON, who was counsel of the Metropolitan Street Railway, New York, for many years, died at his home in Yonkers, N. Y., on March 12, at the age of 68. His demise was caused by pneumonia. Mr. Robinson had lived in Yonkers for more than 40 years and during that time had figured prominently in civic affairs. He was a trustee of the First Presbyterian Church and for twenty years had been head of the governing board of St. John's Hospital. While he was with the Metropolitan Street Railway he took a great interest in association activities and had a wide acquaintance among electric railway operators. After severing his connection with the Metropolitan Street Railway he was identified in a legal capacity with a number of prominent corporations, among them being the Pennsylvania Railroad and the American Telephone & Telegraph Company.

Manufactures and the Markets

New Bridge Proposed to Connect El Paso with Juarez

Plans for a new bridge across the Rio Grande to connect El Paso with Juarez have been submitted for approval to the Department of Public Works of the Mexican Government by the El Paso Electric Company, El Paso, Tex. Upon the approval by the Mexican government, the plans will be submitted to the United States Congress for similar action. The proposed bridge will cost \$250,000 and will replace the present structure on the Santa Fe Street crossing. The structure will be largely of steel and will be longer and wider than the existing bridge. Other improvements by the company, amounting to an additional \$265,000, will include a new bus garage to cost \$35,000.

Larkin Packer Buys Davis Boring Tool Company

Larkin Packer Company, St. Louis, Mo., has purchased the entire property and assets of the Davis Boring Tool Company, St. Louis. The Davis Boring Tool Company will preserve its identity as a division of the Larkin Packer Company. No changes are contemplated in the products of either plant at this time

but sales territories will be thoroughly revised to include capable representation in every principal center.

Supreme Court Upholds Interborough in Car Door Patent Case

The United States Supreme Court has upheld the decision of the Circuit Court of Appeals, Second Circuit, in the case of Samuel T. Walkup vs. Interborough Rapid Transit Company. This was a suit for alleged infringement of patent 1,379,583 on means for operating car doors. Reference to the Court of Appeals suit appeared on p. 37 of the issue of this paper for Jan. 7, 1928.

Shipment of 125 Detroit Cars Completed

Shipment of 125 new Peter Witt type cars for the Department of Street Railways of the city of Detroit, the order for which was noted in the JOURNAL of July 23 and Oct. 1, was completed about the first of the year. These cars have a length over all of 48 ft. 5 in. They are of single-end type and have a total weight of 36,000 lb.; a seating capacity for 52 passengers; are equipped with rattan seats and the interior trim is in cherry.

Exhibitograph No. 4

FOUR weeks from the date of this issue of ELECTRIC RAILWAY JOURNAL applications will go out from the headquarters of the American Electric Railway Association for exhibit space at the convention to be held in Cleveland Sept. 22-28. Do not await the receipt of the blank. It is in the prospective exhibitor's interest to make his plans now, so that the application will not be delayed in reaching headquarters within the 30-day limit set for filing.

International Railway Installs Ohmer Registers

The International Railway, of Buffalo, N. Y., has just installed Ohmer printing fare registers in all of its city cars. The order called for 566 of the No. 22 type Ohmer registers, arranged to record three classes of fares, and operated by a pedal. With the new city installations, which have been recently completed, the entire electric railway system of the city of Buffalo, as well as all of the interurban lines feeding it, is now 100 per cent Ohmer equipped.

Seattle Plans Track Extension Program

Plans formulated by D. W. Henderson, superintendent of the Municipal Railway Department, Seattle, Wash., for a \$1,077,668 track extension program for the municipal lines in various parts of the city, have been submitted to the City Council. Among the extensions planned are: double-tracking around Green Lake, estimated to cost \$216,685; double track on Seventh Avenue N. E. and Fifth Avenue N. E., estimated cost \$330,240; double track on Tenth Avenue N. E., \$54,497; extension on 35th Avenue S. W., to serve the West Seattle district, to replace the buses now operated in that district, \$164,401; Fifteenth Avenue N. E. extension, \$44,513; Eighth Avenue N. W. extension, \$193,680; additional track on the South Seattle line, \$61,733; four additional storage

Name of Railway.....	City of Detroit, Department of Street Railways	Destination signs.....	Hunter
City and State.....	Detroit, Mich	Door mechanism.....	National Pneumatic
Number of units.....	125	Doors.....	Folding
Type of unit Peter Witt two-man, motor, passenger, city, single-end, double truck		Fare boxes.....	Cleveland
Number of seats.....	52	Finish.....	Lacquer
Date of order.....	June 20	Gears and pinions.....	Grade M. & B. P.
Date of delivery.....	Oct. 18, first car	Glass.....	D. S. A.
Total weight.....	36,000 lb.	Hand brakes.....	Peacock staffless
Booster centers.....	23 ft. 9 in.	Hand straps.....	Rico 7
Length over all.....	48 ft. 5 in.	Heaters.....	Gold electric
Width over all.....	8 ft. 4 in.	Headlights.....	Golden Glow
Height, rail to trolley base.....	10 ft. 10 in.	Headlining.....	Agasote
Body.....	Semi-steel	Interior trim.....	Cherry
Roof.....	Arch	Journal bearings.....	Plain
Doors.....	Center and end	Journal boxes.....	Symington
Air brakes.....	General Electric & Westinghouse straight air	Lamp fixtures.....	Electric Service Supplies
Armature bearings.....	Plain	Motors.....	GE-265 and Westinghouse 510-A
Axles.....	Heat treated	Roof material.....	Poplar T. & G.
Car signal system.....	Faraday	Sash fixtures.....	O. M. Edwards
Compressors.....	CP-27 and DH-16	Seating material.....	Rattan
Control.....	K-35-KK	Steps.....	Stationary
Curtain fixtures.....	Curtain Supply	Step treads.....	Kaes
Curtain material.....	Pantasote	Trolley catchers.....	Ohio Brass
		Trolley base.....	Ohio Brass
		Ventilators.....	Railway Utility
		Wheels, type.....	26 in. steel
		Wheelguards or fenders.....	H. B.



One of the new 125 Peter Witt cars for the Department of Street Railways of the city of Detroit

tracks in the Fremont carhouses, \$11,914.

If all these extensions are made, 50 additional street cars will be required, Mr. Henderson said. To date all efforts of the city to purchase new equipment have been halted because of conditions adverse to the placing of equipment trust obligations.

Columbus, Delaware & Marion to Build Shops in Delaware, Ohio

On Dec. 15, the shops of the Columbus, Delaware & Marion Electric Company, located at Stratford, Ohio, were destroyed by fire. As this location was beyond the city limits it was often difficult to secure labor and it was to the advantage of the company to locate the shops in Delaware.

As building in Delaware would mean additional investment the Delaware Chamber of Commerce subscribed \$6,400 for preferred stock enabling the company to build new shops and carhouses within the city.

ROLLING STOCK

MUNICIPAL STREET RAILWAY, Monroe, La., will refinish its cars after the order of one just completed. The exterior of the car has been repainted a dark orange and the interior walls have been finished in oak color with woodwork in national maple, floor in maroon and ceiling in white enamel. The car has been completely overhauled mechanically.

NORTHERN OHIO POWER COMPANY, Akron, Ohio, has received delivery of seventeen twin coaches from the Twin Coach Corporation, Kent, Ohio. Eleven of these coaches are mechanical-drive,

street car type and six are parlor coaches. A gas-electric urban type coach remains to be delivered.

HOUSTON ELECTRIC COMPANY, Houston, Tex., has ordered four more twin coaches from the Twin Coach Corporation. Delivery is expected the latter part of March, making 21 Twin Coaches in Houston.

SHOPS AND BUILDINGS

BIRMINGHAM ELECTRIC COMPANY, Birmingham, Ala., has nearly completed its new carhouse and repair shop. The carhouse is expected to be ready for occupancy within a month.

EASTERN TEXAS ELECTRIC COMPANY, Beaumont, Tex., is remodeling its carhouse and erecting a new Truscon steel bus garage at a cost of approximately \$12,500.

TRACK AND LINE

KANSAS CITY PUBLIC SERVICE COMPANY, Kansas City, Mo., has started work on constructing a loop at the end of the Fifteenth Street line and repaving tracks on Jackson Avenue. The curves and crossings at 31st and Holmes Streets are to be reconstructed and the tracks on Fifteenth Street from Elmwood to Cypress Avenue are to be repaved.

LINN COUNTY LOGGING & LUMBER RAILWAY in the Albany district, Oregon, has applied for a permit from the Interstate Commerce Commission to build 68.6 miles of railroad to tap new timber interests in the Albany region, which will include 40.6 miles of standard main-line construction, at a cost of approximately \$1,000,000, and the construction of four branches to cost \$750,-

000. Connection with the Oregon Electric Railway is to be made 2 miles north of Albany, Ore.

TRADE NOTES

PANTASOTE COMPANY, New York, N. Y., has appointed H. G. Mastin, formerly with the Locomotive Stoker Company, assistant to W. A. Lake, manager of the railway and marine department.

PERFEX CORPORATION, Milwaukee, Wis., builder of heavy-duty industrial engine radiators, announce the opening of a Cleveland office in the Leader Building. A. C. Owen, formerly located at New York, will be in charge of this office, taking over all the Ohio territory in addition to the Eastern states which he formerly covered.

NATIONAL CARBON COMPANY, INC., has moved its branch sales office and factory of the carbon sales division from its former location at 357 West 36th Street, New York, to new and much larger quarters at the company's plant at Fourteenth and Henderson Streets, Jersey City, N. J. This change more than doubles the size of the former plant and considerable additional manufacturing equipment has been added to meet the increasing demand for its brushes and carbon products in the eastern district territory.

WATSON-STILLMAN COMPANY, New York, has elected William B. Updegraff, vice-president in charge of sales. For the last fifteen years Mr. Updegraff has been engaged in various engineering and sales capacities with this company.

WHITE COMPANY, Cleveland, Ohio, has appointed Stanley P. Seward, assistant to vice-president Saunders Jones. Mr. Seward will continue his direction of the advertising department in addition to the new duties he is assuming.

ELECTRO-NITE CARBON COMPANY, Philadelphia, Pa., announces that A. G. McMann is now in charge of its Michigan office, located at 307 Basso Building, 7338 Woodward Avenue, Detroit.

ADVERTISING LITERATURE

CROUSE-HINDS COMPANY, Syracuse, N. Y., has issued two bulletins, No. 2109, "Flood Lighting" and No. 2106 "Floodlights and Industrial Units." The bulletins cover the use of floodlights in commercial and industrial activities as well as for decorative purposes.

CHISHOLM-MOORE MANUFACTURING COMPANY, Cleveland, Ohio, has just issued a new complete catalog on electric hoists. The bulletin is No. 31 and is one of a series being prepared on material handling equipment.

WALTER A. ZELNICKER SUPPLY COMPANY, St. Louis, Mo., has just issued a new bulletin No. 354 giving descriptions and prices of equipment for handling sand and gravel.

SANGAMO ELECTRIC COMPANY, Springfield, Ill., has issued bulletin No. 67 describing the Sangamo type H C meters.

ELECTRIC RAILWAY MATERIAL PRICES—MARCH 13, 1928

Metals—New York		Paints, Putty and Glass—New York	
Copper, electrolytic, cents per lb.	13.825	Linseed oil (5 bbl. lots), cents per lb.	10.2
Lead, cents per lb.	6.00	White lead in oil (100 lb. keg), cents per lb.	13.25
Nickel, cents per lb.	35.00	Turpentine (bbl. lots), per gal.	\$0.64
Zinc, cents per lb.	5.65	Putty, 100 lb. tins, cents per lb.	5.50
Tin, Straits, cents per lb.	50.25	Wire—New York	
Aluminum, 98 or 99 per cent, cents per lb.	24.30	Copper wire, cents per lb.	16.125
Babbitt metal, warehouse, cents per lb.		Rubber-covered wire, No. 14, per 1,000 ft.	5.30
Commercial grade.	57.00	Weatherproof wire base, cents per lb.	16.50
General service.	31.50	Paving Materials	
Bituminous Coal		Paving stone, granite, 5 in.	
Franklin, Ill., screenings, Chicago.	1.825	New York—Grade 1, per thousand.	\$150
Central, Ill., screenings, Chicago.	1.675	Wood block paving 3½, 16 lb. treatment,	
Kansas screenings, Kansas City.	2.125	N. Y., per sq. yd.	\$2.70
Track Materials—Pittsburgh		Paving brick 3½x8½x4, N. Y., per 1,000 in	
Standard steel rails, gross ton.	\$43.00	carload lots.	51.00
Railroad spikes, drive, ½ in. and larger,		Paving brick 3x8x4, N. Y., per 1,000 in	
cents per lb.	2.75	carload lots.	45.00
Tie plates (flat type), cents per lb.	2.25	Crushed stone, ½-in., carload lots, N. Y.,	
Angle bars, cents per lb.	2.75	per cu. yd.	1.85
Rail bolts and nuts, cents per lb.	3.90	Cement, Chicago consumers' net prices,	
Steel bars, cents per lb.	1.85	without bags.	2.05
Ties, white oak, Chicago, 6 in.x8 in.x8 ft.	\$1.40	Gravel, ½-in., cu. yd., f.o.b. N. Y.	1.75
Hardware—Pittsburgh		Sand, cu. yd., f.o.b. N. Y.	1.00
Wire nails, base per keg.	2.65	Old Metals—New York and Chicago	
Sheet iron (24 gage), cents per lb.	2.90	Heavy copper, cents per lb.	11.50
Sheet iron, galvanized (24 gage), cents per lb.	3.65	Light copper, cents per lb.	10.125
Galvanized barbed wire, cents per lb.	3.35	Heavy yellow brass, cents per lb.	7.125
Galvanized wire, ordinary, cents per lb.	3.10	Zinc, old scrap, cents per lb.	3.125
Waste—New York		Lead, cents per lb. (heavy)	4.875
Waste, wool, cents per lb.	16-20	Steel car axles, Chicago, net ton.	\$16.25
Waste, cotton (100 lb. bale), cents per lb.		Cast iron car wheels, Chicago, gross ton.	14.25
White.	16-19.50	Rails (short), Chicago, gross ton.	15.75
Colored.	11-16	Rails (relaying), Chicago, gross ton (65 lb.	
		and heavier)	28.50
		Machine turnings, Chicago, gross ton.	7.75

“1, 2, 3, 4”—



No, this is not a press notice of the favorite song.

It is to remind the electric railways once more that “Peacock” Staffless Brakes have three to four times the braking capacity of ordinary hand brakes. And that among their many other advantages which particularly adapt them to modern car design, are:

A chain winding capacity of 144 inches, enabling them to develop maximum braking power under all conditions.

Light weight. Small space required. Low installation and maintenance costs. Simple, yet dependable operation and many others.

A line from you requesting it, will bring you the detailed story.



The
Peacock
Staffless

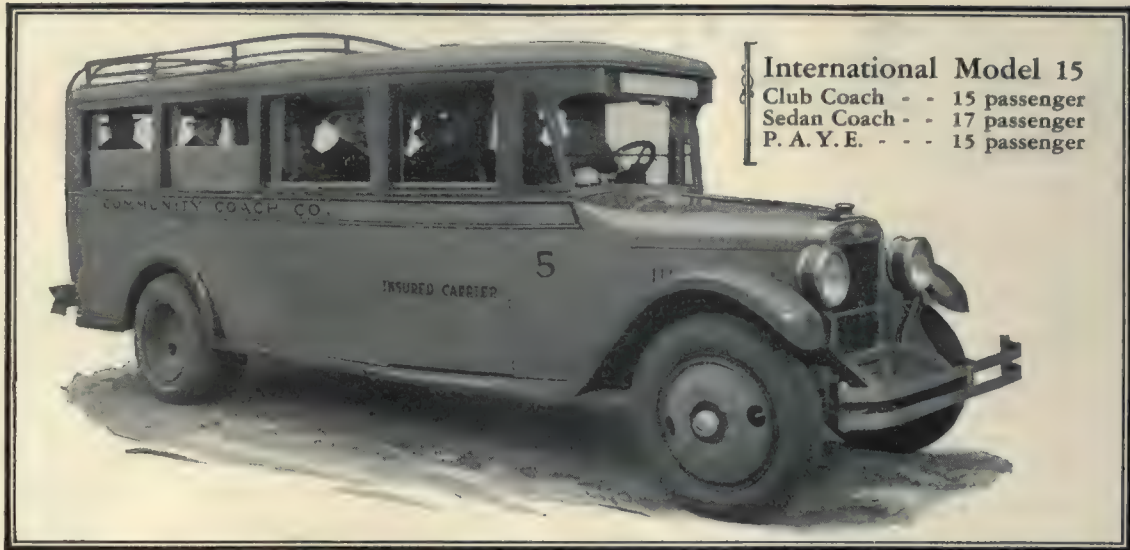
National Brake Company, Inc.

890 Ellicott Square

Buffalo, N. Y.

Canadian Representative:

Lyman Tube & Supply Co., Ltd., Montreal, Canada



International Model 15

Club Coach - - 15 passenger
Sedan Coach - - 17 passenger
P. A. Y. E. - - 15 passenger

International Harvester *Six-Cylinder* COACHES

THE International line of motor coaches fits the practical requirements of every community.

Backed by long experience, these modern coaches are unequalled in mechanical design, beauty, and comfort; unequalled in safety, and in service facilities. Coach traffic men know this. They know that International Coaches are a profitable investment. Experience has shown them that when an International is put on the job it stays on the job—and does the work so well that vehicle problems and operating costs are settled for years. No wonder you see so many International



Beauty and perfection of body appointment, and merit in design and mechanical detail have built a high reputation for International Motor Coaches.

Coaches wherever you go!

Careful study and understanding of coach route requirements has resulted in the development of the Model 15, which has won the esteem of coach operators everywhere. This 6-cylinder

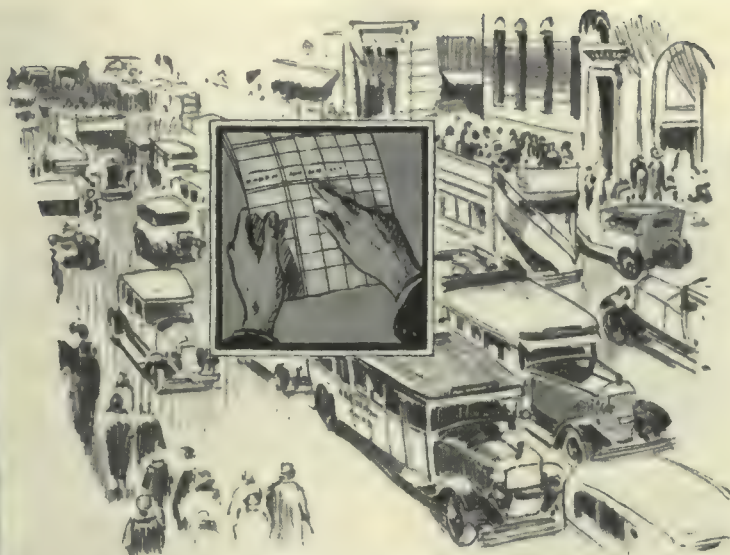
coach is available in three styles—Street Car Type, Club Coach, and Sedan; generously built to carry 15 or 17 persons—the practical capacity. Our new catalog will acquaint you with the many exclusive refinements offered by International Harvester *Six-Cylinder* Coaches. Copies are available by writing us direct.

The International Harvester automotive line also includes the 3/4-ton Special Delivery Truck, Speed Trucks of 1 1/4, 1 1/2, and 2-ton, Heavy-Duty Trucks up to 5-ton, and McCormick-Deering Industrial Tractors. Service is "always around the corner." There are 160 company-owned branches in the United States and Canada.

INTERNATIONAL HARVESTER COMPANY

606 So. Michigan Ave. of AMERICA
(Incorporated)

Chicago, Illinois



The mileage cost *isn't all in the price list*

THERE is always some connection between the price of a tire and the cost of using it. And Goodrich Heavy Duty Silvertown prices are "in line."

But that is only part of the story. When you haul passengers, you are selling

promptness. Changing tires along the road costs more than your driver's time and temper—it costs good-will.

It's the ability of Goodrich Heavy Duty Silvertowns to keep going—it's their remarkable freedom from trouble—and it's their uniformly long mileage—that have won them a place on some of the biggest fleets in the country.

THE B. F. GOODRICH RUBBER COMPANY Est. 1870 Akron, Ohio
In Canada: Canadian Goodrich Co., Kitchener, Ont.

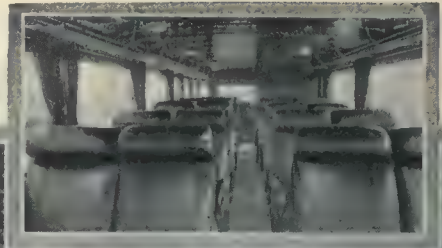
Goodrich

HEAVY DUTY

Silvertowns

HIGH PRESSURE OR BALLOON

Seats have specially designed slants to backs. Note the soft round roll headrests at tops of seats.



Lavatory complete. Included are fresh towel box, waste disposal can, folding washstand fitted with waste bowl and faucets, liquid soap containers, etc.

No Bus Can Be More Comfortable Than Its Seats

The most beautiful bus body in the world can be the most uncomfortable if the seats are unrestful, cramped, tiresome—if passengers have to fidget about constantly to shape themselves into the easiest sitting posture.

No bus can be more comfortable than its seats.

Bender builds its own seats. Bender is the only bus body manufacturer building air-cushioned seats. Seats in Bender Bodies are deep, roomy, flexible; never sagging,

nothing protruding to catch clothing; all backs at correct slant and recessed to permit more knee room.

Years of experience in designing and building thousands of special bodies enable us to incorporate the outstanding features of each into *all our standard bodies at no extra cost.*

Standard bodies and special bodies built to specifications. We shall gladly have our representative call to discuss your needs and then design and build exactly to your order.

THE BENDER BODY COMPANY

W. 62ND AND DENISON



CLEVELAND, OHIO

BENDER BODIES



Uniformity

A Gasoline Requirement for Economical Bus Operation

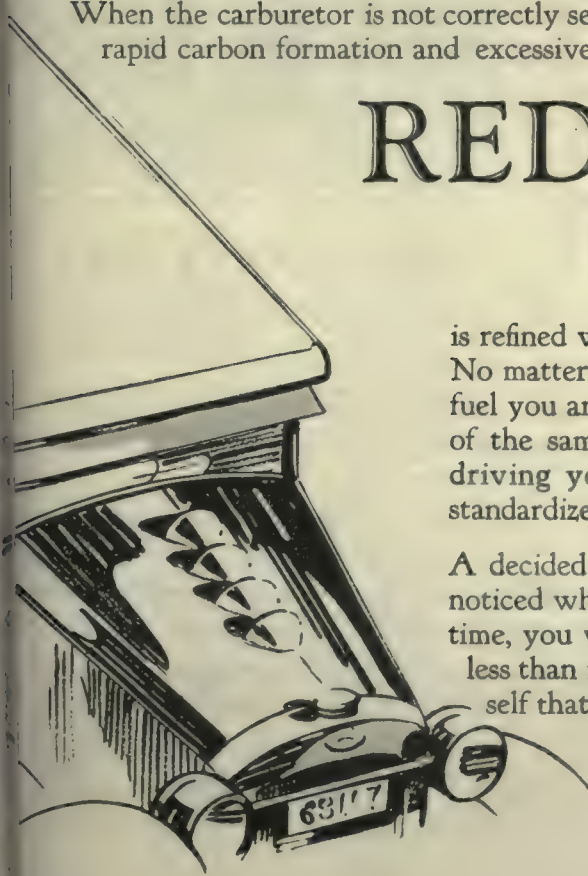
WHETHER you operate one bus or a hundred, it is the gasoline in the tank that, to some extent, determines the cost of operating this equipment. It is very important, when selecting a gasoline for motor bus operation, to know whether or not the fuel always will be uniform in quality, no matter when or where it may be purchased.

To approach anything like satisfactory performance with a gasoline of varying quality, it is necessary frequently to adjust the carburetor. Properly to make these adjustments requires more skill than the average bus driver possesses.

When the carburetor is not correctly set for the gasoline in the tank, loss of power, rapid carbon formation and excessive dilution of the crankcase oil often result.

RED CROWN

Gasoline



is refined with extreme care to insure uniform quality at all times. No matter when or where you purchase this remarkable motor fuel you are assured that the gasoline entering the tank is exactly of the same quality and dependability as that which has been driving your buses since the last fill. It is true economy to standardize on Red Crown Gasoline.

A decided improvement in the operation of your buses will be noticed when you begin using this gasoline. At the end of a year's time, you will observe that the bill for motor fuel is considerably less than formerly. Change to Red Crown today and satisfy yourself that the claims we make for this superior motor fuel are true.

STANDARD OIL COMPANY

(Indiana)

General Offices: 910 South Michigan Avenue Chicago, Illinois



Specialized Service on Fare and Mileage Registers



A Few of the
OHMER
Service Stations

OHMER Fare Registers wherever there are electric railway cars and motor buses; OHMER Taximeters wherever there are cabs; OHMER Mileage Meters wherever there are trucks and commercial cars—everywhere in the United States and Canada—in fact, all over the world.

Think of the sales and service organization that has been developed to install these thousands and thousands of OHMER devices—to keep them in precise working order day and night, year in and year out.

Experts in the Transportation Field

For three decades our company has served the transportation industry. That is the distinctive OHMER field. In all principal cities we have branch offices or sales and service representatives. Every user of an OHMER Instrument is continually assured of prompt and expert accommodation.

The requirements of transportation are exacting. Vehicles must

be kept operating. The metering and recording instruments with which they are equipped must function with unfailing regularity. And OHMER Service has always been equal to the demand, even in times of greatest emergency.

Ask us to send specific information about any OHMER equipment in which you are interested. Write or wire today.

OHMER

REG. U.S. PAT. OFF.
FARE REGISTER CO., Dept. Y., Dayton, O., U.S.A.

The OHMER Line

Fare Registers of many types, with various combinations of indicating, recording, ticket-printing, and totalizing features.

The famous OHMER Ticket-Printing Taximeter—the Atco Taximeter, greatest of all non-printing taximeters—the Atcograf Taximeter—and other models.

Mileage Meters, including the OHMER Odometer, OHMER Hub-Odometer, OHMER Recordograf, and OHMER Truck Auditor.

Astonishing New Ticket Machines which produce up to 2,500 different classes of railroad tickets and keep specific records.

Four styles of Fare Boxes.
Industrial Counters for many purposes.

*OHMERize for Protection,
Economy, Efficiency*



READING COMFORT

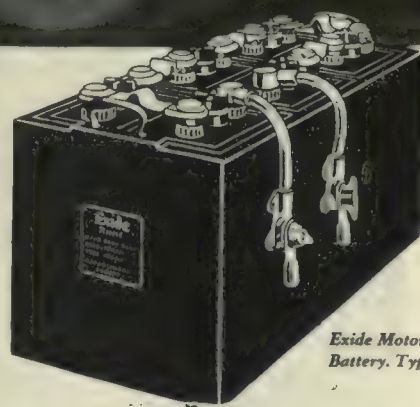
This battery insures the steady, brilliant light that promotes steady business

PASSENGERS like to read when they ride. It makes the trip seem shorter. Bright lights, that promise comfort, are one of the best ways to attract fares. A well-lighted coach is a well-filled coach.

A capable power plant insures brilliant lights. Coach owners realize this. They also realize that the motor coach power plant has a hard job. It must supply enough power to light an average home. The lights must be well placed to maintain reading comfort. A generator of the light capacity, backed by a dependable battery, will maintain lights at their brightest through long running hours.

Exide

**MOTOR COACH
BATTERY**



*Exide Motor Coach
Battery. Type KXX*

When lights dim—business can lag. If the battery falls down, lights weaken—reading comfort is impaired—your business suffers.

Successful coaches—Exide-equipped. Thousands of successful coach owners are careful to see that there is no weakness in their power plant—that the battery on their coaches is up to its job. These coaches are equipped with the Exide Motor Coach Battery.

Specially designed battery—low operating cost. This battery is expressly designed for motor coach service. It is built by engineers who know the gruelling service it must stand. It maintains brilliant lights at lowest operating cost per mile. Reading comfort is a fact. Business is steady.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto



GENERAL'S experience with truck and bus tire problems has been gained through years of contact in supplying the major portion of the truck and bus tire market. In this time General has developed a specialized service—applying factory experience to dealer service. General always tackles the toughest jobs because the General dealer is familiar with the tire engineering problems that must be solved to properly fit the tire to the job.

THE GENERAL TIRE AND RUBBER COMPANY, AKRON, OHIO



The Mark
of Leading
Tire Stores
Everywhere



The

GENERAL TIRE

—goes a long way to make friends

**The
Heavy Express
Special**

The one tire that will carry the load and stand up under express speed—the Heavy Express Special—specially built for the job.

*Luxury
Economy
Sturdiness*
Fitz John



Observation Type that Pulls Patronage.

The luxurious, comforting look of this bus is an invitation to travel.

It bespeaks riding joy—arrival rested and refreshed.

Of course it's a FITZJOHN Body—our 21-Passenger Observation Type.

It is as good as it looks—perfectly appointed—splendidly designed—sturdily built for long, profitable life.

Grille, canopy and other decorative features are of the finest type.

You know how inviting, appealing looks help business, also how sturdy construction cuts costs.

Send for more information on this body.

FITZJOHN Manufacturing Company

Exclusive Bus Body Builders

MUSKEGON, MICHIGAN

Thousands



Map showing the bus routes and trolley connections of The Connecticut Company; inset photograph of a Goodyear Pneumatic Cord Bus Tire



GOODYEAR

of Low-Cost Miles on Goodyears

The reason Goodyear Pneumatic Cord Tires are so greatly preferred in motorbus service the country over is found in Goodyear tire construction.

First there is the All-Weather Tread. The sharp, thick, diamond shaped blocks of this famous tread cut through snow, slush, mud and slime to solid footing, and they hold that footing securely.

There is powerful traction and there is great security in the All-Weather Tread.

* * *

The body of the Goodyear Tire is made of SUPERTWIST, the extra-elastic, extra-durable cord that flexes and recovers resiliently, eliminating shoulder breaks and other causes of blowouts.

There is dependability in Goodyear SUPERTWIST construction. There is freedom from trouble. There is uninterrupted, low-cost, revenue mileage.

There is an easy riding quality the passengers appreciate.

* * *

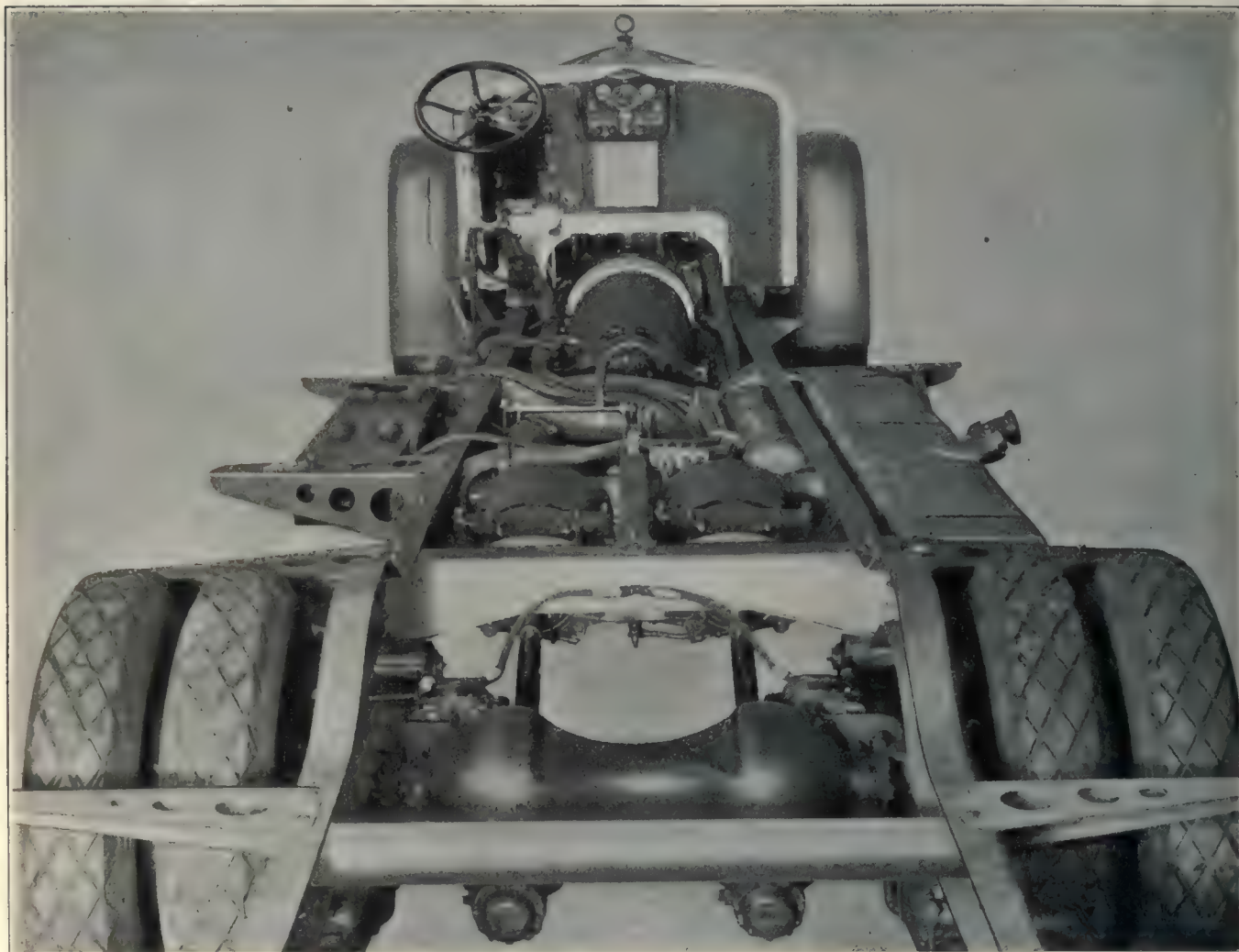
These are the reasons for the 100% Goodyear equipment on such lines as The Connecticut Company.

The 128 motor coaches of this Company average 350,000 miles a month, all on Goodyear Tires.

The records of Goodyears in this service are replete with instances of Goodyear Tires standing up for 22,000 to 28,000 miles.

If you want equally efficient and economical tire performance for your service, equip with Goodyear.

BUS TIRES



Chassis View of New White Gas-Electric Bus

White Announces Powerful Gas-Electric Bus

THE White Company in conjunction with General Electric has developed the most powerful gas-electric motor bus so far produced, making it possible for street railway and bus companies to extend the use of equipment of this type to areas heretofore beyond the range of the gas-electric.

During months of the severest tests the White gas-electric developed from 30 to 40 percent more electrical energy than any type of gas-electric equipment now in use, while in hill climbing ability an average time saving of 40 percent was recorded.

With the famous White six-cylinder overhead valve engine and four wheel air brakes, the new White gas-electric

has been engineered to give the utmost simplicity of operation.

Although not designed primarily for long distance operation the White gas-electric is suitable for routes combining suburban and city traffic conditions.

The chassis has been designed as a self-contained unit with maximum accessibility, body mounting requiring no change in chassis layout.

Write for prices and complete specifications of the White Gas-Electric Bus.

THE WHITE COMPANY, *Cleveland*

WHITE BUSES

FOURS and SIXES

The Public always casts a Heavy Vote for Comfort—Fares are the Ballots!



Is Your Service getting the "votes"?

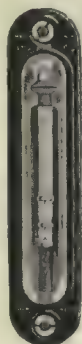
Railway Utility Heating and Ventilating Devices are doing their full share in helping to make street cars modern to the maximum degree.

More than 26,000 cars operating in United States and Canada daily testify to this. They set the finest kind of example and have proven the value of greater

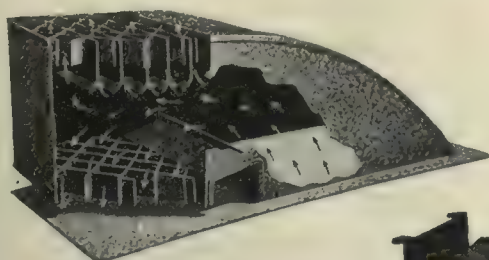
passenger comfort for better net revenue.

Every Railway Utility Heating and Ventilating Device has special features that are worth looking into for the good of your service. These devices are now standard for many railway properties.

We will be glad to talk it over with you.



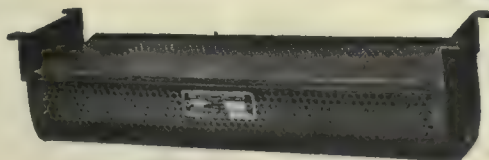
THERMOSTAT



EXHAUST VENTILATOR



FRESH AIR INTAKE VENTILATOR



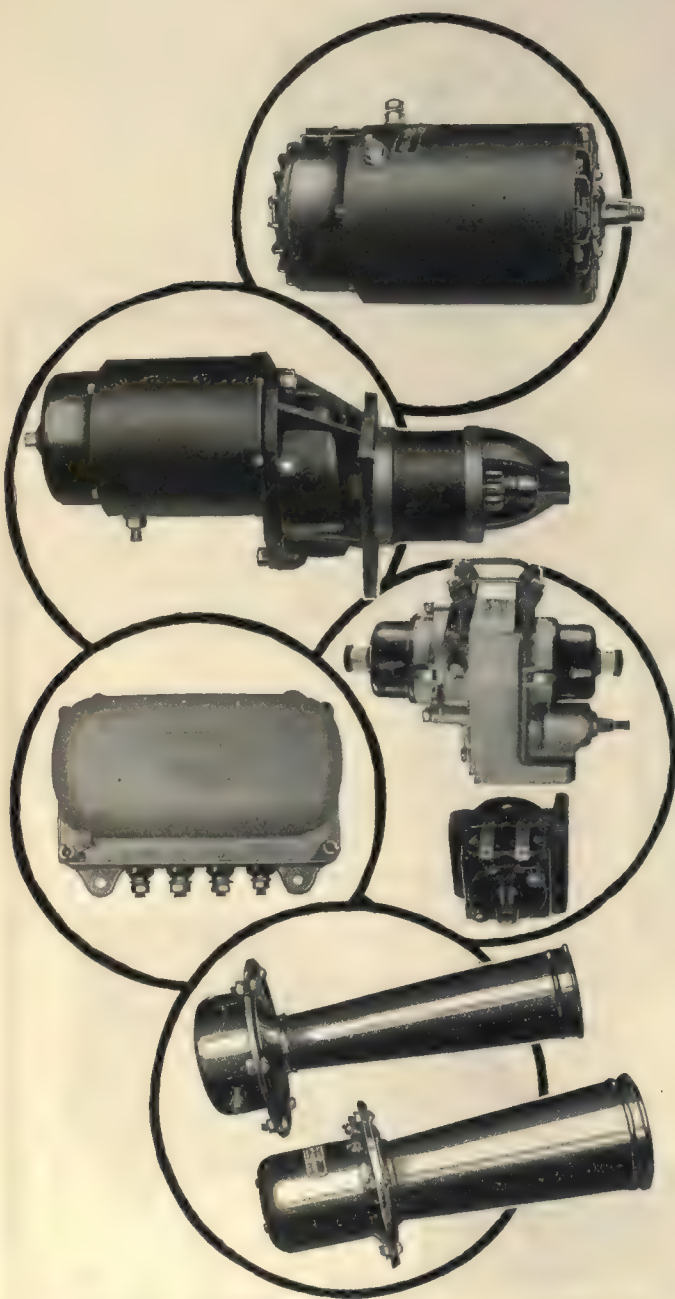
CROSS SEAT HEATER

RAILWAY UTILITY COMPANY

CHICAGO, ILLINOIS

NORTH EAST

On Motor Buses for Public Service (New Jersey)
Motor Buses for Third Ave. Railway (New York)



ON buses recently ordered by Public Service, New Jersey, you will find North East Starters, Generators, Ignition and Horns as standard equipment. And on buses ordered by Third Avenue Railway from three different manufacturers, you will also find North East electrical equipment. Motor bus manufacturers and keen operators know that North East equipment provides dependable and economical operation above the average.

For over seventeen years the North East Electric Company has been making automobile electrical equipment of outstanding ruggedness and long life. And in the rapidly developing motor bus field, too, North East has kept pace. Since 1921, when its first specially designed heavy duty electrical equipment for buses was first built, North East, with its superior voltage regulation, has been the accepted standard of leading bus manufacturers and operators.

North East Equipped

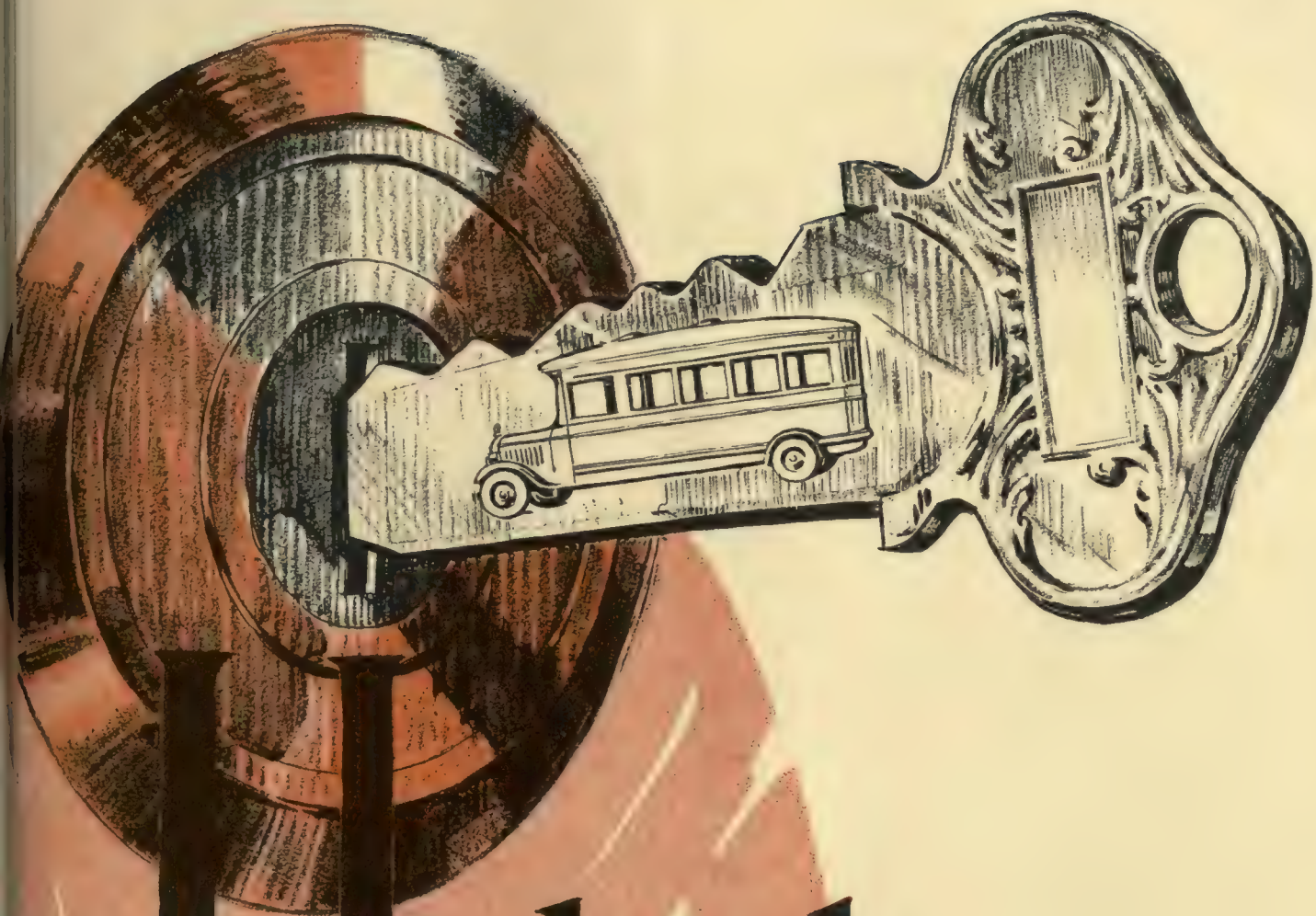
Graham Brothers	Reo	Mack
Yellow Coach	White	Six Wheeler
Versare	Diamond T	Dodge Brothers
Graham-Paige	Delage	Renault
Berliet	Franklin	Sterling Marine
Cottin-Desgouttes	Donnet	Nagant Freres
Sizaire Freres	Gilford	Th. Schneider

—and others of high standing—

NORTH EAST ELECTRIC CO.
Manufacturers of Automotive Equipment
and Electrical Appliances
Starters · Generators · Ignition · Horns
Speedometers · Fract. HP Motors
Electric Drives for Typewriters
Rochester, N. Y.

NORTH EAST
The Equipment That Lasts

NORTH EAST SERVICE INC.
Official Service and Sales Distribution
For NORTH EAST Products
Rochester · Atlanta · Chicago · Detroit
Kansas City · New York · San Francisco
London · Paris · Toronto
Authorized Service Stations the world over



Unlocks
more profits

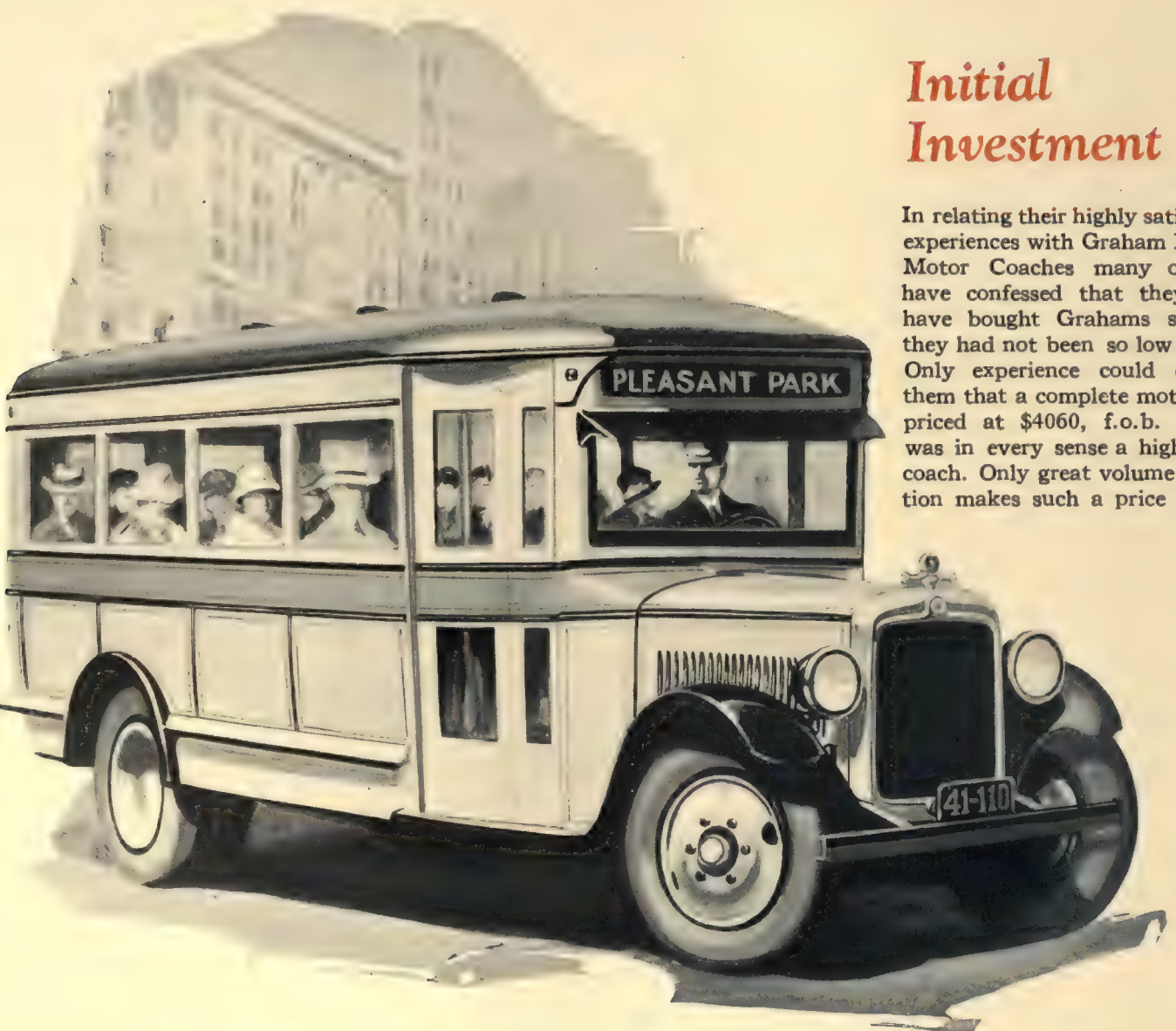
because it fits
definite

transportation needs

- - - a 21 passenger
maximum service

Initial Investment

In relating their highly satisfactory experiences with Graham Brothers Motor Coaches many operators have confessed that they would have bought Grams sooner if they had not been so low in price. Only experience could convince them that a complete motor coach priced at \$4060, f.o.b. Detroit, was in every sense a high quality coach. Only great volume production makes such a price possible.



GRAHAM MOTOR

SOLD BY DODGE BROTHERS

coach that gives
and at **minimum cost**

*Graham Brothers street car type
fits economically into more
transportation situations
than any other motor coach*

Operator after operator analyzes his routes, his schedules, his peaks and valleys of traffic, his costs of operation, his possible revenue, his capital account—and then decides upon the Graham Brothers 21-passenger street car type motor coach. It fits so many requirements so well.

Reasons for its preference are as numerous as its applications—power and speed from the 6-cylin-

der engine, safety with 4-wheel brakes (Lockheed hydraulic), operating flexibility of the 4-speed transmission, low operating costs due to careful design and lack of excess chassis weight, comfort, fine appearance, availability of repair parts and service

The single coach operator and the 200-coach operator have the same experience with Grahams—maximum service at minimum cost.

**BROTHERS
COACHES**

DEALERS EVERYWHERE

- - and the **Parlor Coach** for Deluxe Express Service



SALES of Graham Brothers Parlor Coaches continue to increase. More and more operators find them ideal for deluxe service to patrons willing to pay a higher fare for more speed, less stopping and an individual seat.

The parlor coaches are being used extensively on inter-urban runs; for express service in cities, often paralleling other forms of transportation; at hotels, clubs, resorts and similar institutions; as courtesy cars at manufacturing plants; in airport service.

The complete 16-passenger type is \$4290 and the complete 12-passenger type is \$4045, both f.o.b. Detroit.

GRAHAM BROTHERS

EVANSVILLE — DETROIT — STOCKTON

A DIVISION OF DODGE BROTHERS, INC.
GRAHAM BROTHERS (CANADA) LIMITED, TORONTO, ONTARIO

102 YEARS OF MANUFACTURING EXPERIENCE

Cane Webbing may
be ordered through
any H-W sales office.



No. 327 C

For New Cars or Replacement Use

Here is a good-looking, long-wearing, reversible seat that will help you reduce the equipment cost for new cars or for replacement improvements. The 327 C is fairly inexpensive, yet it embodies all the mechanical betterments of our higher priced seats. This modern style has a soft, comfortable spring back and a deep, single-spring, six-inch cushion. The reversing mechanism, made of malleable iron to withstand hard service, is positive and easy in action.

If you are interested in keeping equipment costs down to a minimum, here is a seat that you will appreciate. A note to the nearest representative, listed below, will bring an experienced man who will be glad to furnish complete details and specifications on the 327 C.

*If you have not received a copy of our
new Bus Seat Catalogue, write for it.*



Heywood-Wakefield

REG. U.S. PAT. OFF.

Heywood-Wakefield Company, Wakefield, Mass.; 516 West 34th St., New York, N. Y.;
439 Railway Exchange Bldg., Chicago, Ill. H. G. Cook, Hobart Bldg., San
Francisco, Cal. The G. F. Cotter Supply Company, Houston, Texas. John R.
Hayward, Liberty Trust Building, Roanoke, Va. The Railway &
Power Engineering Corp., 133 Eastern Ave., Toronto; Montreal;
Winnipeg, Canada.





Better Tires Plus Organized Service

Organized tire service—localized to fit the special needs of each operation—is one of the big developments which Firestone has pioneered to cut bus costs and add to profits.

Nowhere will you find an organization better qualified by experience and knowledge, nor better equipped to work out a service plan, for a fleet or a single bus.

It will pay you to investigate the

Firestone tire service plan which includes not only the right tire for the work, but also the right service after application—particularly planned and carried out to insure for each operator all the extra miles built into Firestone Tires in the world's most modern tire and tube factories. Talk it over with the Firestone Dealer, or write the nearest Factory Branch or the home office, at Akron, for complete information.

MOST MILES PER DOLLAR

Firestone

GUM-DIPPED TIRES

AMERICANS SHOULD PRODUCE THEIR OWN RUBBER . .

Harvey S. Firestone

Bates Truss for all forms of Overhead Structures



**Bates-Truss
One-piece Pole**

The Bates-Truss one-piece expanded steel pole offers a simple and economical supporting unit. Made without rivets, bolts or welds. Adaptable to many uses. Let us know your requirements.

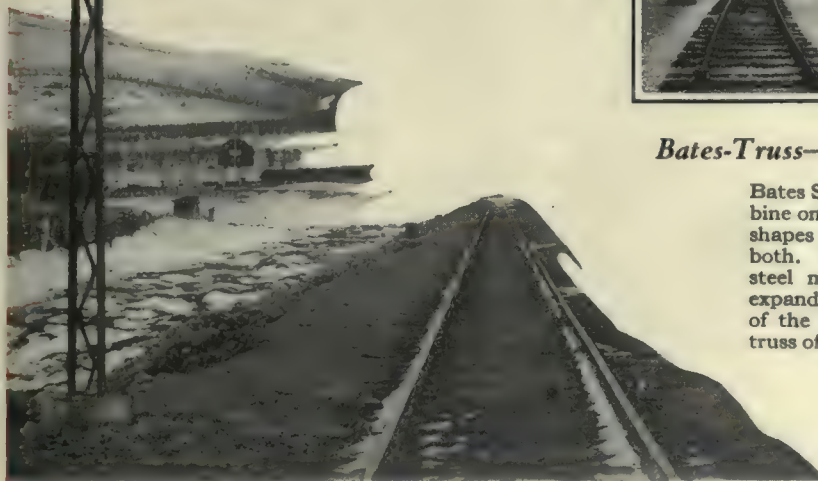
Strength, simplicity of design, reasonable maintenance and erection cost are features of Bates Truss that cannot be overlooked in specifying overhead structures.

The "one piece expanded" principle of design is an exclusive Bates patent and in a great measure responsible for the preference shown Bates Trusses in modernization programs of electric lines throughout the country.



Bates-Truss—Semi-Fabricated

Bates Semi-Fabricated Structures combine one piece members with structural shapes and utilize the advantages of both. In the Bates process a single steel member is slitted, heated, and expanded, transforming the plain web of the beam or channel into a lattice truss of one-piece of steel.



INTERNATIONAL
STANDARD ELECTRIC CORP.
General Export Distributors

SAMUEL BROWN, LTD., *New Zealand*
JOST ENGINEERING CO., LTD., *India*

BATES-TRUSS

Expanded
MADE
ONLY
BY

BATES Expanded Steel Truss Co.

Sales, Engineering and Executive Offices
EAST CHICAGO, INDIANA

F A R E T O K E N S



SCOVILL die-work is of a quality that cannot easily be duplicated. That is why street railway companies wanting surest protection against counterfeit losses use Scovill tokens. Into the manufacture of Scovill tokens goes the richness of over 100 years' experience in the production of fine coins, medals and planchets. We fabricate our own brass and nickel silver to strict laboratory tests. We create designs and dies and build any special tools or machinery required for the job. We also offer unequalled facilities for quantity production. Small wonder, then, that Scovill tokens are favorably known throughout the electric railway field.

Scovill means SERVICE to all who require parts or finished products of metal. Great factories equipped with the last word in laboratories, and modern machinery manned by skilled workmen, are at your disposal. 'Phone the nearest Scovill office.

SCOVILL

MANUFACTURING COMPANY - - Waterbury, Connecticut

NEW YORK — CHICAGO — BOSTON — SAN FRANCISCO
DETROIT — PHILADELPHIA — LOS ANGELES — ATLANTA
PROVIDENCE — CLEVELAND — CINCINNATI
IN EUROPE—THE HAGUE, HOLLAND

Member, Copper and Brass Research Association

TUCO

FLEXOLITH

*Cuts Down the Cost
of Keeping Up Car Floors*

MAINTENANCE, the operator's "bugaboo," has been laid low—at least so far as car floors are concerned. Flexolith Special H. W. Mixture—developed from our experience in furnishing flooring for more than 45,000 cars—has cut the cost of car floor upkeep to a minimum. It is a flooring so durable that, when our specifications are followed, it is guaranteed against wear and

disintegration for at least five years.

At one and the same time, Flexolith is exceptionally light in weight and attractive in appearance while presenting a fireproof, sanitary, non-slip tread. It is a surface which requires no slats or other covering and which, in fact, is cleaner, looks better and wears longer than any covering which could be used.

TUCO PRODUCTS CORPORATION

Executive Offices, 30 Church Street, NEW YORK

80 East Jackson Boulevard, CHICAGO, ILL.

915 Olive Street, ST. LOUIS, MO.

MONTREAL, CANADA ST. PAUL, MINN.

LOUISVILLE, KY.

630 Louisiana Ave., WASHINGTON, D. C.

751 Monadnock Building, SAN FRANCISCO, CAL.

HOUSTON, TEXAS BOSTON, MASS.

Carbon the magnificent

ABOUT a hundred years ago Sir Humphry Davy proved conclusively that the diamond is but pure crystallized carbon—merely carbon that has put off its working clothes of charcoal, coal and coke, soot and smoke, and put on formal attire.

Carbon, said Sir Humphry, would find better things to do than act as the sparkling symbol of wealth, pomp and power, or to burn in grates, stoves and furnaces. Workaday carbon, black carbon, he thought, would eventually bring mankind such precious gifts that one day's enjoyment of them would give the world riches exceeding all the diamonds ever mined.

As an earnest of the newly discovered properties of carbon, he produced the first electric arc light, using two pieces of charcoal. It was the most brilliant light mortal man had ever struck, and it came from the blackest of all substances.

Were this scientist to return to us today he would be astounded by the extent to which his prophecy has been fulfilled. For carbon has transformed the world. Without carbon, electricity would still be a laboratory curiosity. With carbon brushes, electricity has become nature's most gorgeous gift to man.

The National Carbon Company is proud to have played a leading part in carbon's progress, most of which has been made since the company's organization in 1886, and a great part of it in the NCC laboratories.



NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide  and Carbon Corporation

Carbon Sales Division

Cleveland, Ohio



San Francisco, Cal.

Branch Offices and Factories

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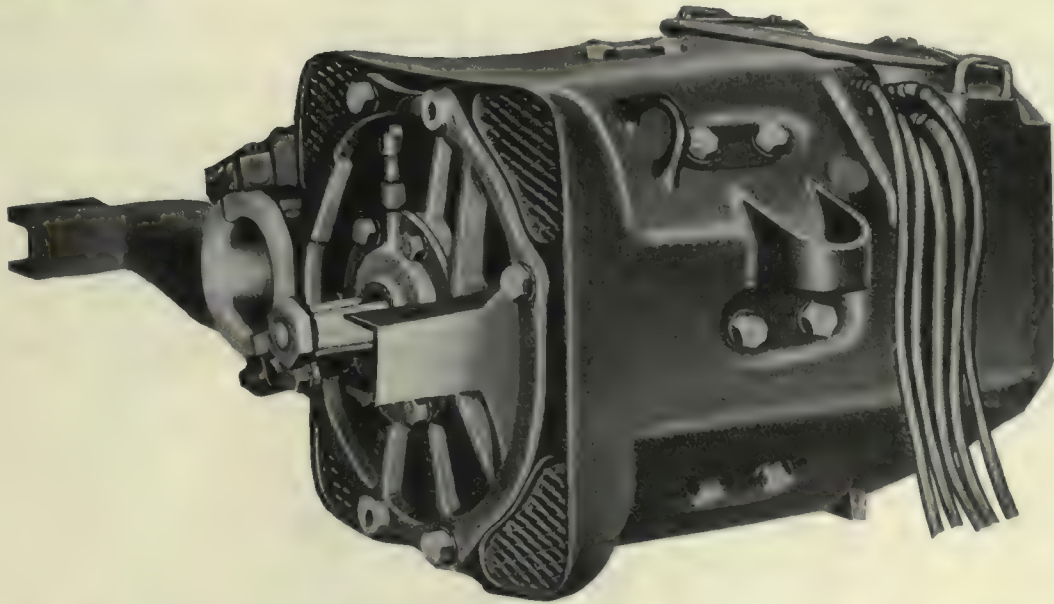
NEW YORK, N. Y.

BIRMINGHAM, ALA.

Nothing is
apt to cost
so much as
a bearing
that cost
so little

Another one of the 57 electrical manufacturers
that uses **SKF** Bearings as standard equipment

GENERAL ELECTRIC CO.



For Long-Life Service on Railway Motors The Highest Priced Bearing in the World

KEEPING railway motors out of the shops is the job that **SKF** Spherical Bearings are doing faithfully for street railway companies. On the type of motor shown, **SKF** Spherical Bearings have been used for over four years. Their great capacity, thrust ability and self-aligning features assure long-life despite the severe conditions encountered in street railway service.

Rugged construction coupled with low friction qualities and elimination of wear make for greater electrical efficiency of the motor. Armatures are always held in proper relation to fields. The danger of damaged pole pieces or windings is abolished. Then, too, lubricant is kept in the bearings by sealed housings which effectively prevent its entrance to other parts of the motor.

*You men who plan, build, use or pay for machines of any kind, remember this: It costs more to replace a poor bearing than to buy the best one that **SKF** ever produced. AND **SKF** ANTI-FRICTION BEARINGS ARE THE HIGHEST PRICED IN THE WORLD.*

SKF INDUSTRIES, INCORPORATED, 40 East 34th Street, New York, N. Y. 1997

SKF

Ball Bearings



Roller Bearings



ACCUSTOMED to the luxurious comfort and the cleanliness of the Velmo upholstered seats in de luxe steam railway cars, the traveling public naturally prefers those "Electrics" wherein this same superb mohair upholstery affords equal riding satisfaction...and protection for their clothing. For practical luxury choose and use

CHASE
Velmo

Made by SANFORD MILLS, Sanford, Maine
Selling Agents, L. C. CHASE & Co., BOSTON
New York · Detroit · Chicago · San Francisco



The Surface Transportation Corp.
of N.Y. subsidiary of
**The Third Avenue Railway
System Specified Lang
All-Steel Bodies**



Passengers and Operator will share these points of Lang all-steel body design - - - - -

THE Lang all-steel body is equal, or lighter, in weight than most composite bodies, and has the added advantage of lasting durability and greater strength, plus low cost of maintenance.

The clear vision front contributes to the ease and safety of driving, and the comfort and pleasure of passengers.

The simplicity of maintenance lowers maintenance cost and shortens the time of servicing.

The circulating load plan makes it possible to handle crowds at rush hours more quickly.

The luxurious atmosphere created by many refinements, not usually found in a city service coach, adds to the pleasure of riding and helps create new passengers.

These many advantageous points of body design, as engineered by Lang, assures the Surface Transportation Corporation of the last word in modern body design and construction. That the Lang Body Company received the order is a tribute to the skill and far-seeing vision of Lang craftsmen.

*"After all—
it's the Setting
that counts!"*



LANG BODIES

create new passengers

THE LANG BODY COMPANY
CLEVELAND, OHIO

Eastern Representative:
A. H. SISON
1845 Grand Central Terminal Bldg.
New York City

CRASH!

and FLYING GLASS claims *more* victims!

It happens often . . . one of these nights it may be *your* bus.
The reports always read very much the same—"Fifteen hurt . . .
Two seriously . . . most of the injuries were due to flying glass . . ."

65% of all injuries in motor car accidents are due to flying glass.
An appalling percentage . . . more appalling still when practically
all of these injuries *are avoidable*. Equip with PROTEX glass now
. . . the glass that does not fly . . . the glass that is economically
possible for motor bus safety. Investigate!

Protex

GLASS

for
SAFETY

Maintenance

—are a great responsibility. One unexpected revenue you hoped to use for other service

To insure the greatest net revenue use only render the kind of service the riders want—at afford!

Here are a few Nuttall developments which m



The Nuttall Aluminum Trolley Base with Timken Bearings.

The Nuttall Aluminum Trolley Base—with Timken Bearings, is the lightest base we have ever made, weighing only 67 lbs., and has all the features of the famous U. S. 20A base including Timken Roller Bearings. Wearing parts of hardened steel. Ample shunts to carry current. Lubrication on once-in-six-months' basis. Light on the wire. Reduces wear and practically immune to dewirement troubles.

*You will be interested in complete details.
Ask us for them.*

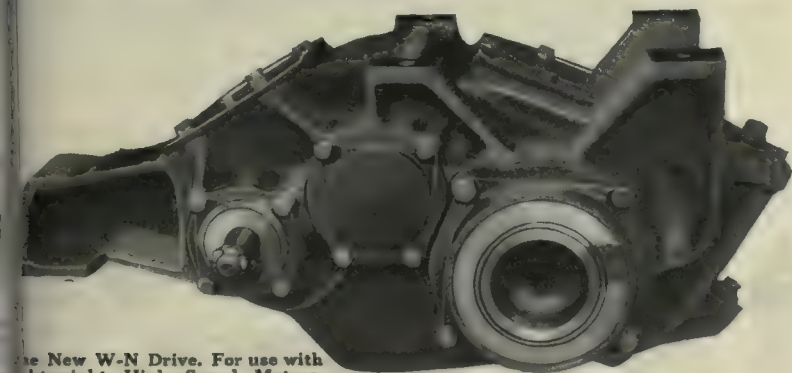
Nuttall

Budgets

air bill, due to faulty car parts, takes away the
vements.

s of established merit—parts that will help
eating and maintenance cost the railway can

service requirements:



The New W-N Drive. For use with
lightweight High Speed Motors.

The New W-N Drive. For use with light
weight High Speed Motors.

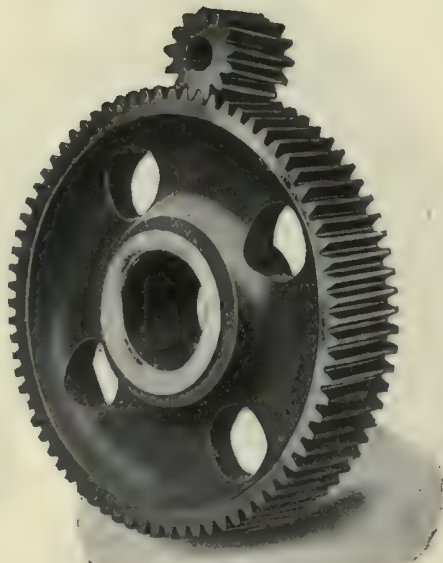
A light compact drive unit for electric cars
which makes it possible to use modern high
speed, high efficiency motors in traction
service. All gears are heat-treated and
hardened, operating in an oil-tight steel case.
The net result is an installation of lower
initial cost, with improved operating effi-
ciency and requiring very little maintenance.

The Nuttall Standard Helical Gears—
will do more to make a car comfortable and
easy-riding than all the upholstering you

could put into it. And, because of the
Nuttall BP Heat Treatment which they
undergo, they show a service life so substan-
tially longer as to warrant their adoption on
this score alone.

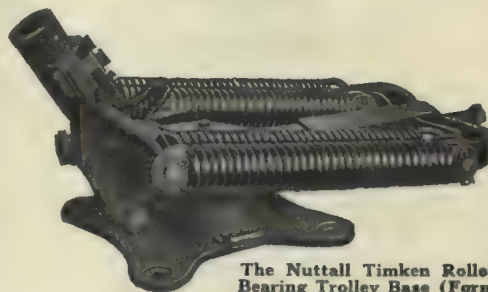
The Nuttall Timken Roller Bearing Trolley
Base (Form U. S. 20A).

The most advanced type of the more conven-
tional trolley base. Nuttall U. S. 20A is
equipment on many of the most successful of
recent modern cars. A simpler, longer-lived,
easier-to-maintain trolley base would be hard
to imagine.



Nuttall Helical Gear and
Pinion

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA



The Nuttall Timken Roller
Bearing Trolley Base (Form
U. S. 20A)

All Westinghouse Electric & Mfg. Co. district offices are sales representatives
for Nuttall Railway Products.

Canadian Agents: Lyman Tube & Supply Co., Montreal and Toronto

Nuttall

A grip on Maintenance Costs!

When considering the expensive service interruptions so often caused by trolley cord, maintenance men should not confuse "cheap" trolley cord with "low priced" trolley cord, which is cheap by the pound but costly by the year.

Retain your grip on maintenance costs!

Specify Trolley cord made of uniform fine yarn, which can be braided smoothly—to prevent abrasion or choking the retrievers; braided firmly—to avoid stretching and swelling; thoroughly waterproofed—to avoid rotting.

SAMSON SPOT TROLLEY CORD

SAMSON

Bell and Register Cord

Buy Samson Bell and Register Cord with absolute assurance that it is of the same high quality and manufactured with the same care as Samson Spot Trolley Cord. It resists abrasion. Can be supplied in any reasonable size or length, in white, mahogany or drab.

Samson Signal Cord with galvanized wire center is made in mahogany color, sizes No. 6 and No. 8.

—is cheap Trolley cord, because it is smooth and firm and thoroughly waterproofed. It is pliable uniform in thickness and guaranteed free from rough places or imperfections. The colored spots identify the cord as our best quality.

In short, it is a real trolley cord, designed for the purpose, and will enable you to get the upper hand on maintenance costs.

SAMSON CORDAGE WORKS

88 BROAD STREET

BOSTON, MASS.



MADE

MARK

Elreco Tubular Steel Poles Have Very Definite Advantages



Two views of Washington Blvd., Miami Beach, Fla. Observe, handsome appearance, inconspicuous lighting circuit and elevation of lights.



Tubular steel trolley poles are the only ones that have ever met all the conditions of the operating companies. Such a pole is Elreco.

The Prodigious strength of Elreco Poles resists collisions—life is indefinite, many Elreco Poles are in perfect condition after 30 years' continuous service—maintenance costs are minimum.

Elreco trimness adds distinction to any thoroughfare. Accessibility allows for easy inspection. Adaptability permits trolley wires, lighting wires and lighting units to be carried by one pole, and lighting units may be mounted high enough to give maximum illumination.

New and advanced designs, in nearly all types, now distinguish electric railway equipment.

Knowledge, based on years of experience, enables us to anticipate the needs of the industry. It's one of the big reasons why the Elreco Tubular Steel Poles have very definite advantages.

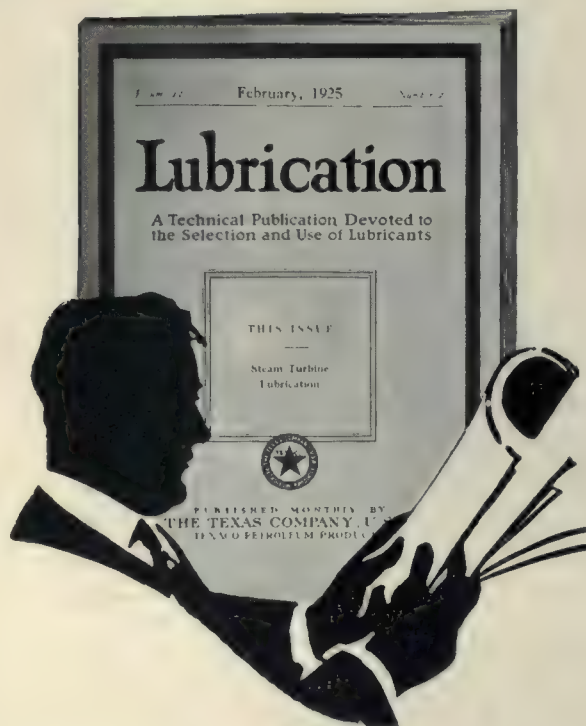
Send for an Elreco representative.
Let him show you how to improve
appearances, increase operating
efficiency, reduce costs. Address

**The Electric Railway
Equipment Co.**

2900 Cormany Ave.
Cincinnati, Ohio

30 Church St.
New York

"MORE IMPORTANT THAN LUBRICATION IS TO KNOW WHICH LUBRICANT TO USE —AND HOW"



THIS publication has for seven years merited the highest respect and praise among machinery operators and machinery manufacturers, and among Lubricating Engineers in every conceivable industry and profession—in this country and throughout the world.

In Industry's acceptance of this publication, The Texas Company's position in the oil industry, the reputation of its Engineering Department as well as the high quality of TEXACO lubricants have undoubtedly played a part.

However, it is our honest belief (corroborated by hundreds of readers of "Lubrication") that the real reasons for this magazine's popularity are the prac-

tical, concise manner in which it covers the application of the science of lubrication, the value and scope of the subjects discussed, and the handy, up-to-the-minute Recommendation Chart, covering the material contained, in each issue.

This latter feature alone—the list of TEXACO Lubrication Recommendations—has caused many, many lubricating engineers, power plant executives and purchasing agents to accept "Lubrication" as their foremost "lubrication catechism."

To engineers, executives and purchasing agents who desire to keep informed regarding up-to-the-minute Lubrication Recommendations—we shall be glad to send the magazine "Lubrication" (free) every month.

You can never know too much
about Lubrication, so

.....Clip This Coupon.....



THE TEXAS COMPANY

Texaco Petroleum Products

Dept. E3, 17 Battery Place, New York City

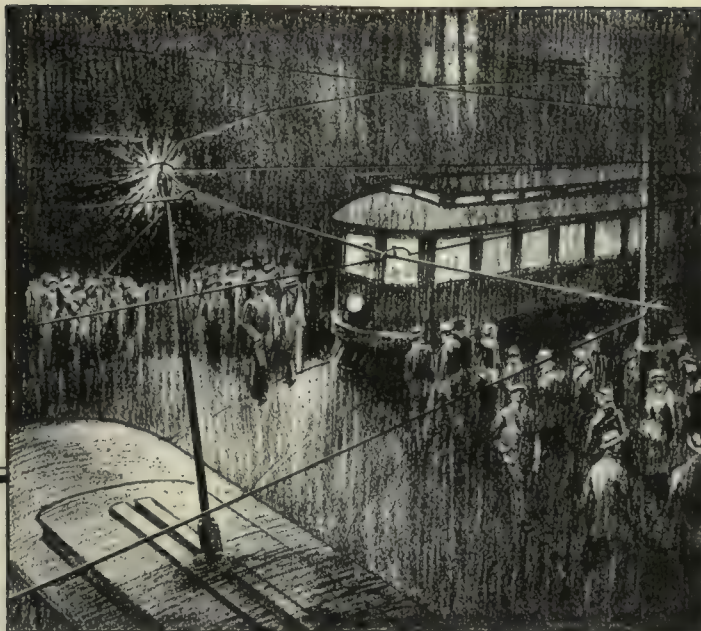
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Where
operating conditions
are unusually severe
HITENSO TROLLEY WIRE

HITENSO Trolley Wire, exclusively an Anaconda product, combines high strength with the least possible sacrifice in conductivity.

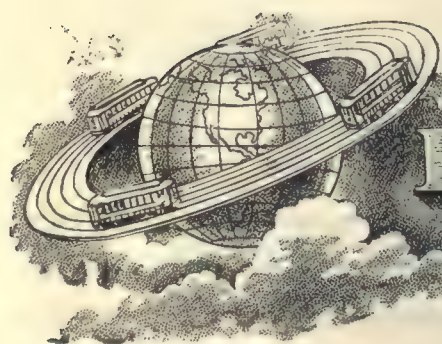
Hitenso "C" meets the strength requirements of the A.E.R.A. specifications for High Strength Bronze, and exceeds the conductivity by 15%. Hitenso "A" meets the specifications for Medium Strength Bronze and exceeds the conductivity by 15%. In terms of electrical efficiency, Hitenso "C" is 37½% better than High Strength Bronze, and Hitenso "A", 23% better than Medium Strength Bronze.

ANACONDA COPPER MINING CO.—THE AMERICAN BRASS COMPANY
Rod, Wire and Cable Products

General Offices: 25 Broadway, New York Chicago Office: 111 W. Washington St.

ANACONDA WIRE PRODUCTS

JUST as the electric railway companies have to compile and be guided by exhaustive statistics as to peak loads, traffic densities, costs per mile, and so forth, we must constantly keep ourselves informed as to purchasing power, density of population and all vital market information in order to maintain our service as an active asset of your service.




Barron G. Collier

INCORPORATED

CANDLER BLDG. NEW YORK

HOFFMANN



THE rugged stand-up-ability of the "Hoffmann" Precision Roller Bearing—even under shock, jar, and heavy overload—makes its appeal to those railway executives and engineers to whom consistently lower maintenance costs mean more than a small saving in first cost. The "Hoffmann" stands more, lasts longer, and costs less.

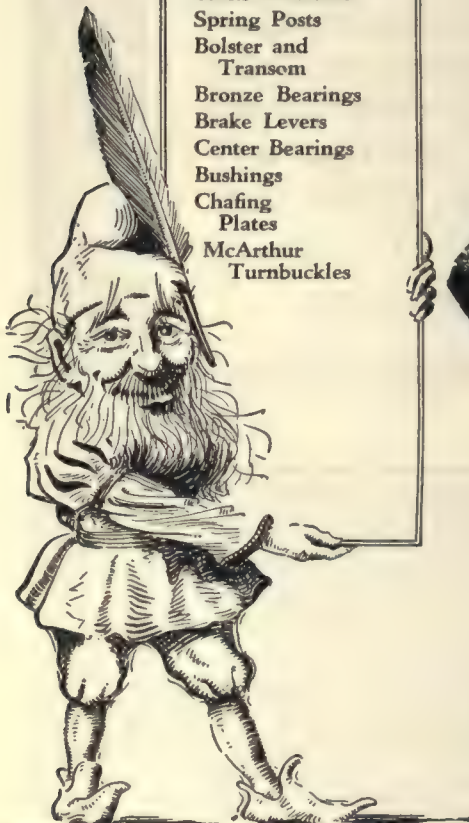
Ask for Catalogs 905 and 917.

NORMA-HOFFMANN BEARINGS CORP'N
Stamford, Conn., U. S. A.

BOY



Brake Pins
 Pedestal Gibs
 Side Bearings
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BOYERIZE—and those new cars will stay modern longer!

Think of the grinding of sudden stops and the jarring—to which those new cars will be subjected! Will they stand up under these severe service strains?

Boyerize them and they will! Briefly, Boyerizing gives car parts a life three or four times that of ordinary steel. It keeps maintenance costs at a minimum over the greatest number of years.

Convince yourself! Boyerize one or more cars for a test. Comparative cost and performance figures prove that “to Boyerize is to Economize.”

Detailed information and quotations on request.

BEMIS CAR TRUCK COMPANY

Electric Railway Supplies

SPRINGFIELD, MASS.

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J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 519 Delta Bldg., Los Angeles, Cal.



VIZABLED G
PATENTED
SAFKAR
TRADE MARK REG.
SAFSTEP

Put your own dollars-and-cents value on these exclusive "Safstep" features, as applied to your own equipment:—

Slip-proof in all weather—not because of abrasive mats or units, but because of the edge-on steel bars, and the distinctive mesh.

Miss-proof because of the double crimp of the bar next to the nosing bar, making a distinctly visible edge.

Durable because made of steel throughout, solidly riveted in a rigid, self-contained unit fitting any style of carrier—nothing to wear out or work loose.

Economical (a) because it prevents costly accidents; (b) because there is no up-keep upon it; (c) because it is a natural foot scraper and helps keep the car clean.

Adaptable because made in both folding and rigid types, in sizes to fit any car or any style of mounting.

Write for Bulletin 2D28.

IRVING IRON WORKS CO.
LONG ISLAND CITY, N.Y. U.S.A.

Established in 1902

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Three ROLLER-SMITH Aids To Better Maintenance

R-S Rail Bond Testers

are known and used all over the world. They are the standard with which all others are compared.

The Type SBT is recommended for all ordinary work and the super-sensitive Type BBT for conditions where there is little or no current in the rail. Bulletin G-200 should be in the hands of every man who is interested in bond testing. Send for your copy. Use the coupon

New Type HTD Circuit Tester

The new Type HTD Circuit Tester is the instrument that *everyone* has been waiting for. With it one can instantly locate open circuits in coils and circuits of all kinds. It shows directly the approximate resistance of the coil or circuit up to a range of 10,000 ohms. It is small, compact, rugged and thoroughly dependable. The small, standard flash-light cell is self-contained. The price is very low for such an instrument. The many other features of interest are given in new Supplement No. 1 to Bulletin No. G-300. Send for your copy. Use the coupon.

New Type COM Ohmmeter

The COM Portable Ohmmeter is direct reading, accurate and entirely self-contained. Measures resistance values from .5 ohm to 50,000 ohms. The price is right. Send for new Supplement No. 1 to Bulletin No. G-300. Use the coupon.

"Over thirty years' experience is back of ROLLER-SMITH"

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Electrical Measuring and Protective Apparatus

Main Office:
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Roller-Smith Co., 2140 Woolworth Bldg., New York City

Gentlemen: Please send me: Supplement to G-300 ☐ Bulletin G-200 ☐
(Check one or both).

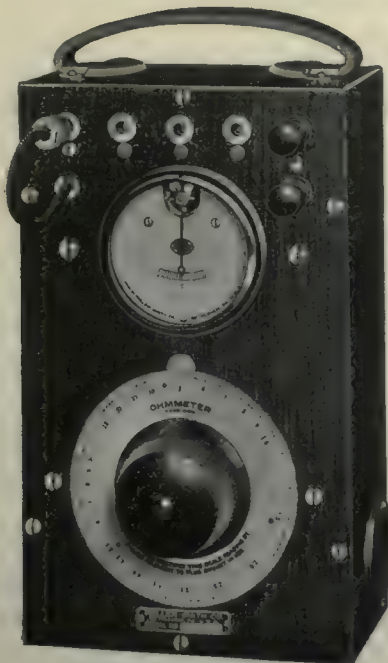
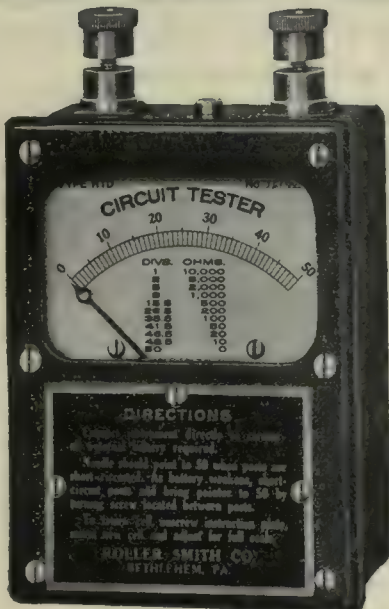
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Trying to Reduce?



IF you are trying to reduce the upkeep of your electric Motors—try Stackpole—the Carbon Brush in which the ingredients are scientifically balanced to meet the exact commutation requirements of each type and make of motor.

Regardless of the number of types of motors you are now using you will find that Stackpole Carbon Brush experts have anticipated your every brush requirement.

This thorough knowledge has been gained by over 20 years of intensive specialization.

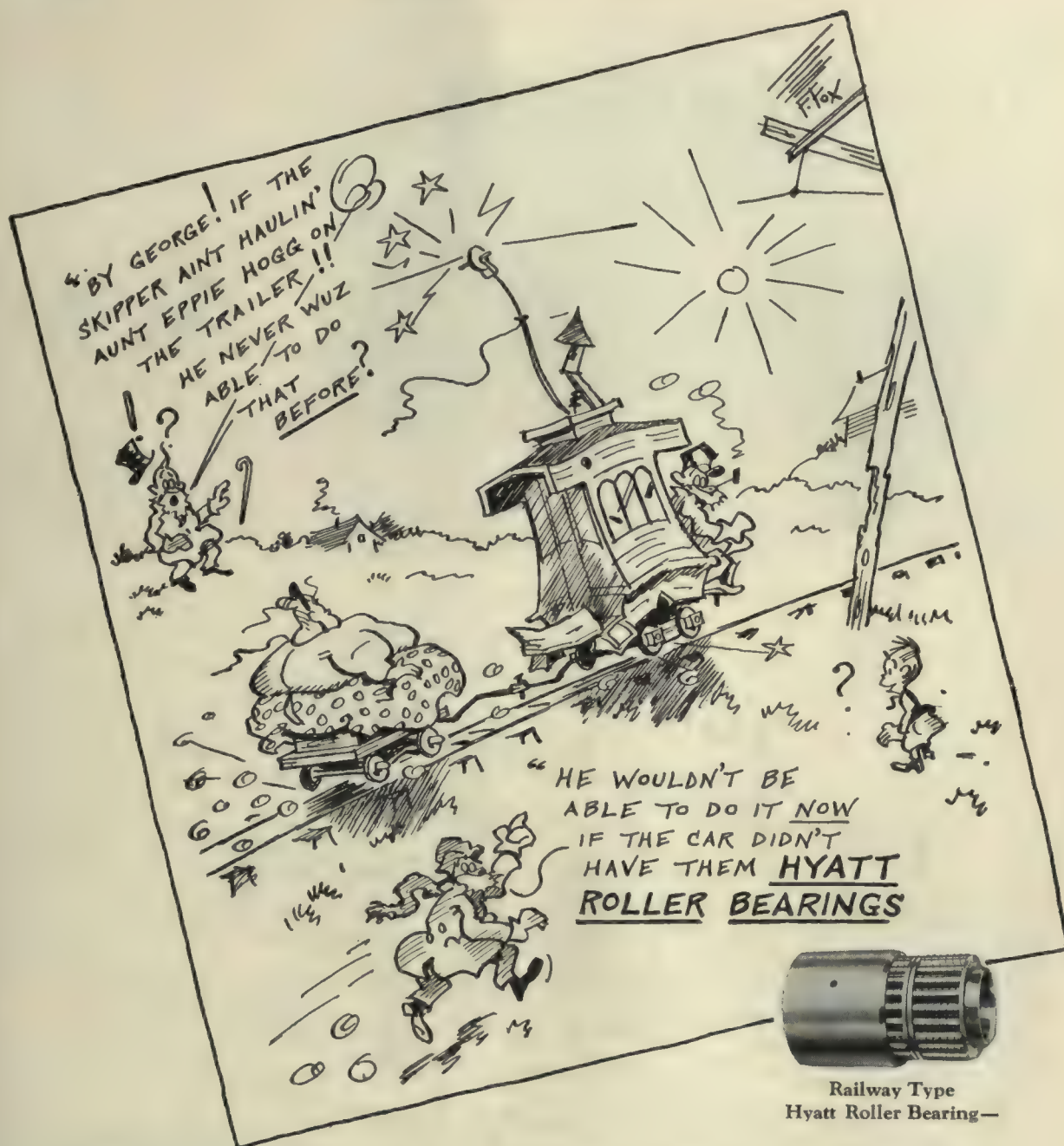
Thus in availing yourself of Stackpole Carbon Brush service, you not only secure the inherent advantages of these master-made brushes but also the personal services of a Stackpole expert who will make an individual analysis of your motor equipment and then recommend the correct types of Stackpole Brushes you need.

Why not inquire today?

**STACKPOLE
CARBON COMPANY**
ST. MARYS, PENNA.



Stackpole carbon brushes



Railway Type
Hyatt Roller Bearing—

Definite power savings result from the use of Hyatt Roller Bearing Journal Boxes. Under the increased demands of rush hour overloads, the true rolling motion of Hyatt bearings make possible quicker starts and smoother running without the customary exorbitant increase of power. Adding lubrication economy, increased flange life, sturdiness, shock absorption and long bearing life, you realize why Hyatt Roller Bearing Journal Boxes are popular on so many properties.

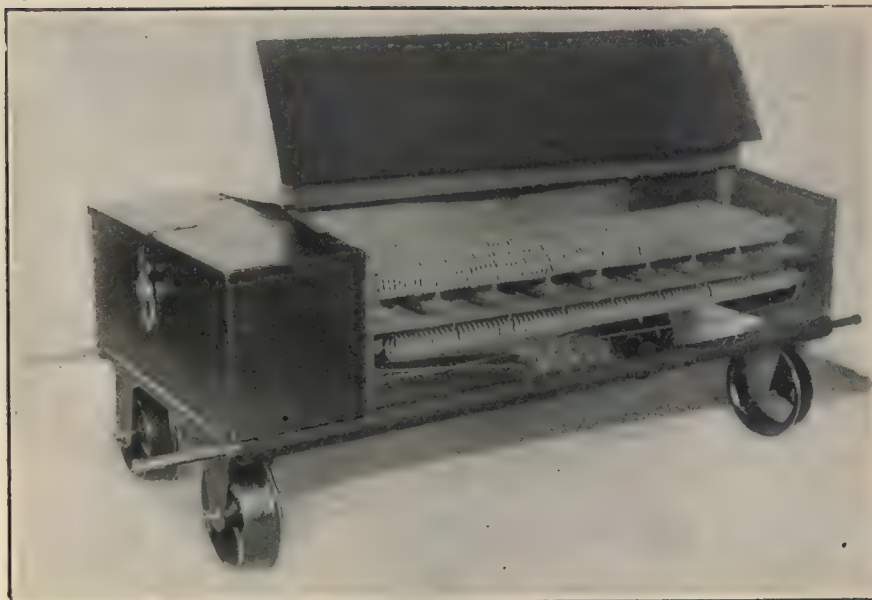
HYATT ROLLER BEARING COMPANY

Newark Chicago Detroit Pittsburgh Oakland

HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS



New SBR Braze Bonding Outfit

You Pay Less For Quick Installation—

The more bonds installed per day, the lower the cost per bond—that's plain economics. Ten, fifteen and twenty braze bonds applied per hour is proof of the ease and rapidity with which these bonds can be installed. Using the type W portable welding furnace, application is practically automatic. Each bond applied has the eight to one ratio of contact area to conductor area—the ratio of conductivity of copper to steel.

The new Type SBR single unit rheostat still further aids the operator. One storage compartment 12 x 13 x 52 and a tool box 11 x 13 x 30 provide ample space for storing all supplies and

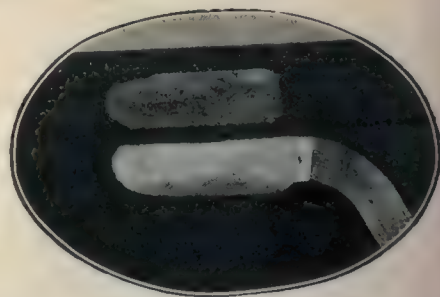
equipment. The roller bearing wheels make it easy to move the rheostat along the track.

The resistance path of $\frac{1}{4}$ " diameter nickel chrome wire is made in seven removable sections. In operation, all coils are completely open to the air. A double set of insulation between the coils and the ground gives added protection. Full 200 amperes capacity can be secured on voltages as low as 400.

Your bonding dollar will buy the largest amount of efficient bonding when you use Erico Braze Bonds. Write now.

THE ELECTRIC RAILWAY IMPROVEMENT CO.
Cleveland, Ohio
2070 E. 61st Place

Over 30,000 lbs. were required to shear this braze bond terminal from the rail—permanency guaranteed. The area of copper left on the rail was just eight times the cross-sectional area of the bond conductor. This ratio of conductivity of copper to steel, assures maximum bond conductivity.



ERICO

RAIL BONDS AND BONDING OUTFITS



Intelligent Planning for low-cost maintenance

Every highway or rail vehicle needs maintenance...regular routine maintenance.

Versare has reduced the maintenance cost per car-mile, not by any optimistic attempt to eliminate the *need* for regular attention, but by planning every detail of the 6-wheel Highway Unit so that inspections, adjustments and replacements can be made in minutes rather than hours...and in hours instead of days

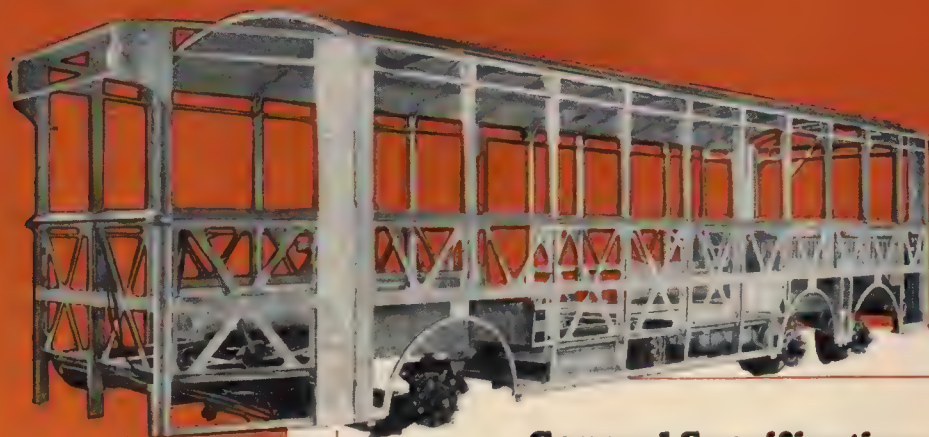


Versare

Sectional Truss Frame Construction

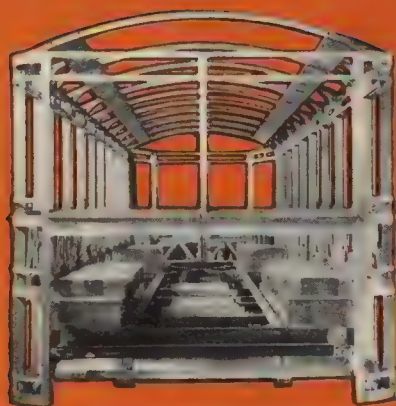
(Patents Pending)

Usual body maintenance practically eliminated



General Specifications

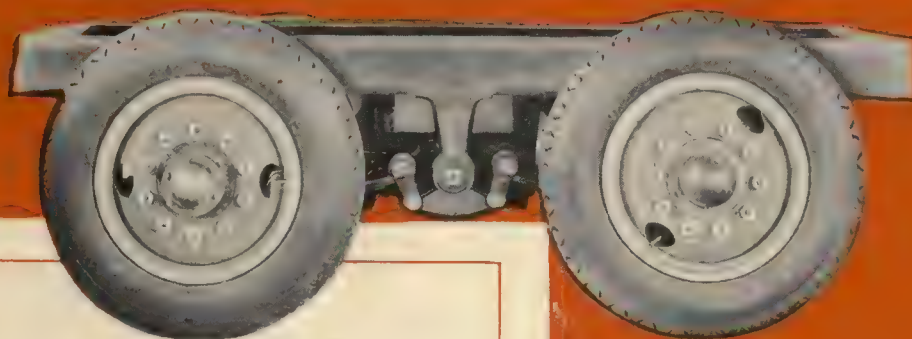
- Engine:** Heavy duty 6 cylinder 125 hp.
- Electrical Equipment:** Versare-Westinghouse Type 177 generator; Two Versare-Westinghouse 33 hp. vehicle type motors; Westinghouse standard vehicle control equipment.
- Brakes:** Westinghouse Air on four wheels. Mechanical hand brakes on two wheels. Resistor for electric braking in emergency.
- Axles:** Versare-Eaton, both front and rear. Patented Versare Equalizer on rear truck.
- Wheels:** Van Type 728.
- Body:** Duralumin truss construction.
- Doors:** Front, 36 in. duplex outward folding. Rear, 29 in. dual duplex outward folding with or without Automatic Treadle control.
- Length:** 28 ft. } overall. Wheelbase { 180 in.
29 ft. 11 in. } 195 in.
- Breadth:** 8 ft. overall.
Aisle width 21 in. at seat base. 24 in. at seat back.
- Height:** 9 ft. overall.
Headroom 6 ft. 6 in.
- Turning Circle:** 56 ft.
59 ft.



Rear End Engine Mounting - - - - -

(Patents Pending)

Unit replacement of all engine and body parts

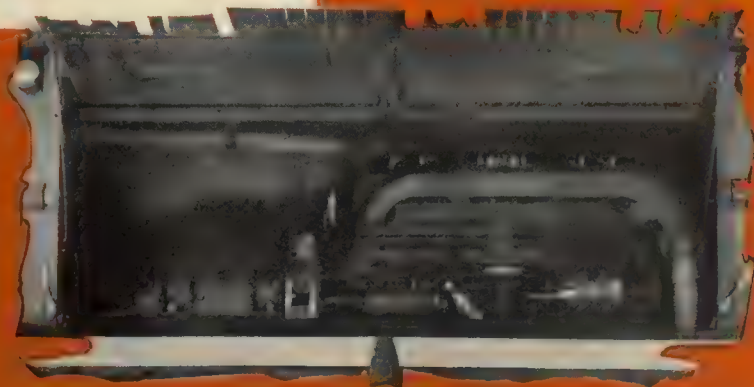
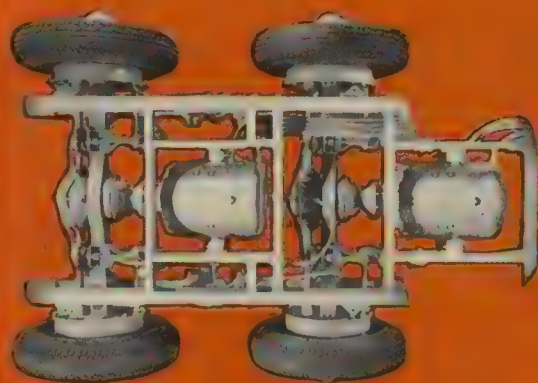


On the score of maintenance, Versare Highway Units offer electric railway operators two vitally important advantages. First, by reason of the sectional, rigid trussed-girder frame construction, eliminating the chassis entirely, the entire vehicle becomes comparable in strength with the best of modern railway rolling stock. Automotive standards of depreciation and general maintenance no longer hold.

Secondly, the Versare Highway Unit is built on the sectional principle throughout. Not only has it been made possible to replace damaged body sections in a few hours, but all operating equipment is most readily accessible, and removable for rapid unit replacement in the average railway maintenance shop.

The entire power plant, mounted in the extreme rear of the vehicle can be removed, without the use of a crane, in approximately 30 minutes.

Versare Highway Units have been designed for regular service, under railway management and operating standards, at a total cost per car-mile that will show a profit under present day conditions.



Versare Service - -

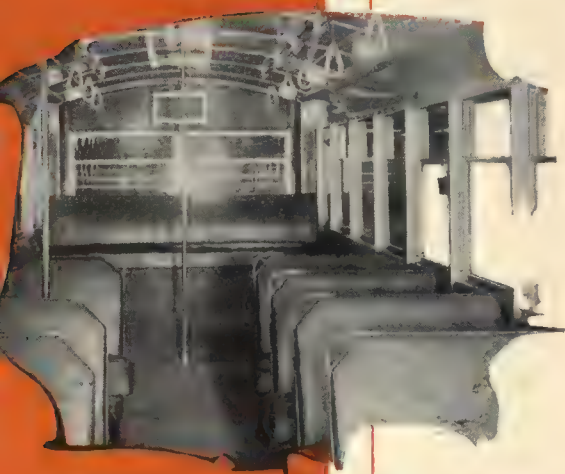
Individual . . .
Practical

guaranteeing the performance of every Versare Highway Unit . . .

Versare insists that every Highway Unit placed in service shall perform in accordance with published claims. We employ a number of specially trained service mechanics, who are expert in the operation of our vehicles, and who are available at a moment's notice to answer service calls.

These are strictly practical men who will work personally with your own mechanics and drivers to assure the satisfactory operation of Versare Highway Units under any given conditions of service.

Versare Corporation
Albany, N. Y.



For You and For Your Passengers

The Fisk Motor Coach Balloon saves wear and tear on equipment, increases the riding comfort of passengers, improves service standards and reduces maintenance costs

In its original features of construction lie the secrets of the Fisk Motor Coach Balloon's outstanding performance and economy.

With "Fillerless" Cord, the multi-cable bead and the heat and wear resisting tread, Fisk engineers have perfected the Motor Coach Balloon. Strength, cushioning action and continued trouble-free service make it the most dependable and economical tire for motor coach fleets.

THE FISK TIRE COMPANY, Inc.
Chicopee Falls, Mass.



FISK TIRES





BOTH large and small traction systems can profitably standardize on these products. They are lowest in ultimate cost and highest in net efficiency. Purchasers of More-Jones Quality Products enjoy complete confidence in our uniform products and our ability to always lead in new engineering practices. Let us give you complete details.

More-Jones Trolley Wheels

They are finished and bored in one operation, thus insuring proper balance. The metal used is exceedingly tough—an alloy of purest new metal, having maximum conductivity—which provides greater mileage without damage to the overhead lines.

V-K Oil-less Wheels for City and Suburban service and More-Jones lubricated Wheels for high speed requirements insure lowest ultimate cost.



"Tiger" Bronze Axle and Armature Bearings

The Lead content, that we scientifically incorporate into this alloy, minimizes frictional wear, resulting in less frequent replacements. Finished oversize or undersize to a perfect running fit with your shafts.

Expertly machined in strict accordance with your specifications, even to the extent of incorporating special features therein, if so desired.

All Armature Bearings lined with our celebrated ARMATURE Babbitt Metal.

"Tiger" Bronze Axle and Armature Bearings insure maximum service under the hardest operating conditions.

More than 50



Why you can depend on "More-Jones" Quality

MATERIALS

The first thing of importance for consideration is the materials that go to make up products. In this, More-Jones has, thru all its years of manufacture, given particular attention to the grade of materials used. Only materials proven by laboratory test to be most suitable for each individual product are employed.

MANUFACTURE

This plant has the most modern facilities and a thoroly trained and equipped organization. The process of manufacture is modern. New improvement in methods are inaugurated as fast as we find there is a possibility for facilitating our service. Many machines are exclusive to More-Jones production and afford numerous advantages.

RESEARCH

Work has always been conducted on an extensive scale in this organization. We have a highly developed system of chemical and engineering research, prospecting for improvements. Patented molds, equipment and special processes have developed from this and have been a factor in producing products that contribute to economical traction service.

UNIFORMITY

We have always considered uniformity as a vital necessity. Thru every department this factor is borne in mind and conscientiously adhered to. Uniformity of the product is the positive assurance of greater operating economy and less of maintenance.

SERVICEABILITY

More-Jones Products have stood the test of time in both city and country traction service. They provide maximum life and it is this that helps bring economy to your service right from the start.

More-Jones Armature
Babbitt Metal



Standard on the majority of Electric Railway Systems in this country.

Specially formulated for the exacting requirements of Electric Railway Armature Bearing maintenance.

Its high heat radiation minimizes friction, even under the most trying circumstances.

A trial is the most conclusive proof of its superior inherent characteristics.

Let us give you further information and prices.

NATIONAL BEARING METALS CORPORATION

New York, N. Y.
Jersey City, N. J.

St. Louis, Mo.
Portsmouth, Va.

Pittsburgh, Pa.
Meadville, Pa.

MORE-JONES QUALITY PRODUCTS

Years of Service

ALUMINUM TRANSPORTATION in Cincinnati!

For transportation—not of passengers but of electrical current—the Cincinnati Street Railway Company has just recently bought aluminum busbar for substations.

Since January 1st of this year, our southern Ohio sales office has sold aluminum busbar to: the Cincinnati Street Railway Company, to two steel companies, and to two electro-plating manufacturers.

These five installations differ in nature, but each of these buyers has purchased busbar that is light in weight, resistant to corrosion, and

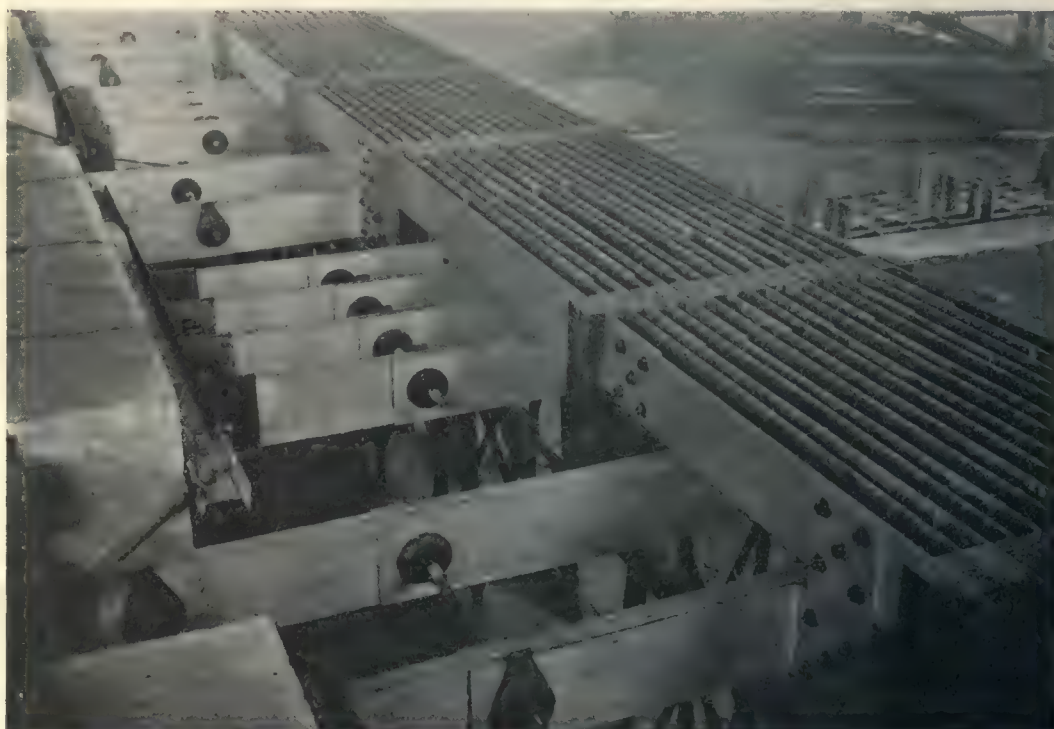
—mention this to the Board of Directors—

lower in cost.

ALUMINUM COMPANY OF AMERICA

2400 Oliver Building, Pittsburgh, Penna.

The photograph below is from "Aluminum Busbars," a 24-page illustrated booklet for engineers and busbar buyers. Sent free on request—please use your letterhead.



ALUMINUM BUS FEEDING FURNACES, SHOWING ALUMINUM SWITCH PLATES FOR DISCONNECTING THE FURNACES.

Electric Heaters
Pneumatic Door
Operating Equipment



Buzzers and Bells
Thermostatic Control
Equipment

WHEREVER passenger comfort and convenience are paramount considerations, experienced operators consistently choose Consolidated Equipment.

**CONSOLIDATED
CAR HEATING COMPANY**

New York City Albany, N. Y. Chicago, Ill.

Amcreco products cut maintenance costs

AMCRECO Creosoted Southern Yellow Pine Poles keep maintenance costs low because they are long lived and maintain their original strength, thereby avoiding failure under extreme loading. You are safe in using Amcreco poles even for such important locations as the terminal pole on a sub-station feeder line pictured above. Note also that big companies find creosoted poles can be used without detriment for location as exposed as the one shown here.

Amcreco Creosoted Ties save track labor in any type of track—particularly under pavement. One electric railway reports a saving of \$528 per mile of track for creosoted ties under pavement costing \$1.00 per sq. yd. and \$1,188 per mile under pavement costing \$3.50 per sq. yd.

You can begin to get these savings right away. Specify Amcreco poles and ties.



AMERICAN CREOSOTING COMPANY

COLONIAL
CREOSOTING
COMPANY
INCORPORATED



LOUISVILLE ~ KENTUCKY

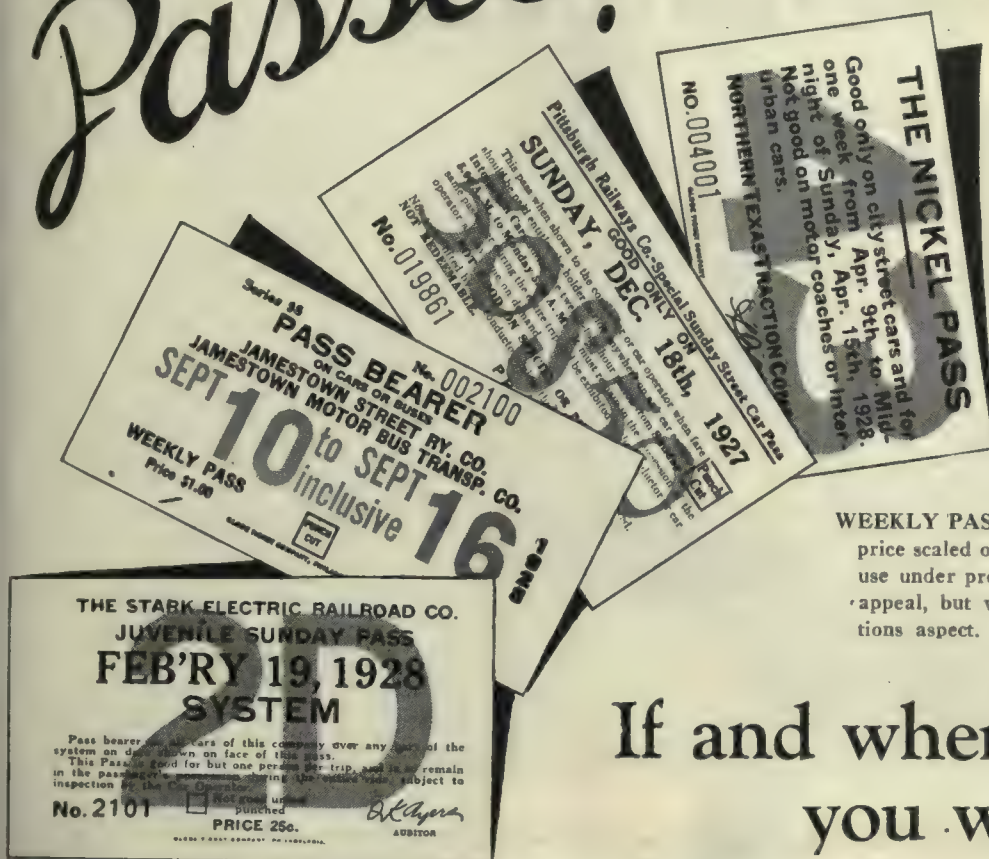
GEORGIA
CREOSOTING
COMPANY
INCORPORATED

SALES OFFICES

332 So. Michigan Ave.
Chicago
350 Madison Ave.
New York City

401 W. Main St.
Louisville, Ky.
Brunswick, Ga.
Bogalusa, La.

Passes!



NICKEL PASS: A way to "merchandise" rides with odd-cent rate. Rider drops nickel and shows pass every ride. Purchase price based on twelve rides per week. Our graphs show comparatively small decrease under base fare up to 20 rides. Additional advantages are elimination of odd-cent change, a bargain inducement to ride on off-peak hours, and sell easier than weekly passes because of lower initial outlay.

WEEKLY PASS: Flat-rate, unlimited. Selling price scaled on average regular rider's weekly use under prevailing fare. Also has bargain appeal, but valued chiefly in its public relations aspect.

If and when you want them

SUNDAY PASS: Introduces the Sunday Excursion feature to Electric Railway traffic programs. Can be tied in with publicity to provide definite objectives for Sunday riding—time otherwise spent with the Sunday newspaper or in the family auto. Also adapted to park, beach and other excursion runs.

NOT every road can or cares to use passes. Yet under proper conditions, one or more of the various pass systems are building up revenue today on numerous properties. Here's why:

1. Increase riding, especially at off-peak hours.
2. Assure revenue whether pass is used or not.
3. Speed up schedules by faster loading, through reduction in change making.
4. Reduce auditing.
5. Bring a week's riding to a definite figure which far out-classes the automobile.

Globe has made a careful study of various pass systems, among them the Nickel Pass, Weekly Pass, Week End Pass and Sunday Pass. Each has its place. If you use revenue passes, take advantage of our broad contact in the Electric Railway ticket field, particularly in relation to numbering and color and symbol codes for revenue passes.

GLOBE'S 50 years of experience in every type of fare collection is at your disposal, and will be 50 years hence. Put it to work on your lines now.

Globe

TICKET COMPANY

112 North Twelfth Street
PHILADELPHIA

New York Boston Cleveland
Baltimore Albany Los Angeles
Cincinnati Pittsburgh



PUBLIC RELATIONS AND THE DIFFERENTIAL METHOD



Nothing so cements the cordial relations between you and your Public
as the appearance of your equipment.

Nothing so compels the respect of your Public as its knowledge that your
operations are efficient, up-to-date, and the best practice.



*Thus the Differential Method Arms You
with a Two Edge Sword.*

It will cut your construction costs
and at the same time it will cut
down Public Criticism.

Differential Equipment Looks Safe—It IS Safe.

DIFFERENTIAL ELECTRIC DUMP CARS


DIFFERENTIAL BODIES-3 WAY DUMP.

CLARK CONCRETE BREAKERS—DIFFERENTIAL ELECTRIC LOCOMOTIVE CRANE CARS.

THE DIFFERENTIAL STEEL CAR COMPANY
FINDLAY, OHIO, U. S. A.

Guide

TILT RAY HEAD LAMPS



ASK your drivers to name the outstanding problem in maintaining night schedules, and you will readily understand why Tilt Ray Headlamps have come into such popular favor for motor coach and truck service. Dimming is no longer necessary. . . . A mere touch of the switch lever or floor button tilts the long range beam of light directly in front of the car for safe passing. . . . And the same simple operation restores the long light so necessary for fast open road driving. The Guide Motor Lamp Manufacturing Company Cleveland, Ohio.

*To make a Long light-
Short*

GUIDE

Combination Stop-Tail Lamps

No motor-coach or truck is properly equipped unless it carries efficient and dependable Stop-Tail Lamps. The models shown here have been designed particularly for motor-coach and truck service and are built with the same skill and careful workmanship which characterizes all Guide Products.



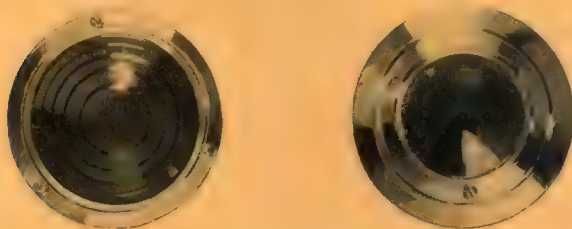
GUIDE *Dome Lamps*

Interior lighting in a motor-coach is either an asset or a liability. The well lighted coach attracts, while the dim interior creates ill-will. That is why Guide has specialized for a long time on interior lighting and is able to offer operators the most up-to-the-minute system of inside lighting—the dome lamp. The two numbers shown here are typical of the most complete line available today.



GUIDE *Marker Lamps*

No matter what your requirements of a marker lamp may be, you can take care of them satisfactorily with Guide. The two models shown here are representative of the quality, design and construction to be found thruout the whole Guide Marker Lamp line.



Guide

TILT RAY HEAD LAMPS



OKONITE PRODUCTS

OKONITE
INSULATED WIRES
AND CABLES

MANSON AND
DUNDEE
FRICTION TAPES

OKONITE
INSULATING TAPE

VARNISHED
CAMBRIC CABLES
OKONITE CEMENT

OKOCORD
OKOLOOM

OKONITE- CALLENDER PRODUCTS

IMPREGNATED
PAPER CABLES
SUPERTENSION
CABLES

SPlicing
MATERIALS

On the Broad Street SUBWAY Philadelphia, Pa.

NOT only all new cars on the Broad Street Subway of Philadelphia, but the entire signal systems have been wired throughout with OKONITE. The selection of OKONITE for signal and interlocking systems, where cable and wire *must* prove utterly dependable, has demonstrated the true economy of this superior grade of quality insulation. It was a logical conclusion that similar quality in car wiring would lead to similar economies. Many railway operators, therefore, are now specifying "OKONITE throughout"—OKONITE for signals—OKONITE in the power house—and OKONITE throughout the car.

The Okonite Company The Okonite-Callender Cable Company, Inc.

Factories: PASSAIC, N. J.

PATERSON, N. J.

SALES OFFICES: NEW YORK CHICAGO PITTSBURGH ST. LOUIS ATLANTA BIRMINGHAM
SAN FRANCISCO LOS ANGELES SEATTLE

General Electric Supplies Corp., Boston, Mass. F. D. Lawrence Elec. Co., Cincinnati, O.
Novelty Electric Co., Philadelphia, Pa.

Canadian Representatives: Engineering Materials Limited, Montreal

Cuban Representatives: Victor G. Mendoza Co., Havana





Seat leadership for

From the days of one horse power horse cars to present-day ultra modern, multi horsepower trolleys and buses, Hale & Kilburn Seats have led in passenger-creating comfort.

During all these years Hale & Kilburn Seats have been designed and built in anticipation of demands for comfort and luxury—major factors in creating passenger patronage.

Keeping pace with the great strides made during recent years in transportation progress, the latest models of Hale



No. 900
Rotating Chair

No. 900—double rotating chair in combination plush and leather with deep individual seat cushions and divided back. For double-end interurban cars.

No. 900-D—double chair without arm rest. For city type cars.

No. 392-A—double Walkover seat with divided spring edge back and double deck spring edge cushion. For city service.

No. 392-A—double Walkover seat with plain spring back and double deck spring edge cushion. For city type cars.

No. 392-EE—Walkover seat with high divided spring back and deep double deck spring edge divided cushion. For double-end interurban cars.

No. 900-D—double stationary chair in combination plush and leather with deep individual seat cushions and divided back. For buses and single-end interurban cars.



No. 900-D
(without armrest)



No. 392-A
(with divided cushion and back)

For utmost comfort in every type of service—



over half a century !

& Kilburn Seats offer every conceivable demand for comfort, appearance and space-saving design. Whether you require light, substantial rattan or leather seats for city service, or soft, luxurious, deep cushioned seats for inter-urban operation—specify Hale & Kilburn and you can be assured of the latest word in passenger producing design.

Let a Hale & Kilburn representative call on you and discuss your needs. A Hale & Kilburn catalog will reach you by return mail.



No. 900-D

HALE & KILBURN COMPANY

General Offices and Works:
1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

- | | |
|---|--|
| Hale & Kilburn Co., Graybar Bldg., New York | T. C. Coleman & Son, Starks Bldg., Louisville |
| Hale & Kilburn Co., McCormick Bldg., Chicago | W. L. Jefferies, Jr., Mutual Bldg., Richmond |
| E. A. Thornwell, Candler Bldg., Atlanta | W. D. Jenkins, Praetorian Bldg., Dallas, Texas |
| Frank F. Bodler, 903 Monadnock Bldg., San Francisco | H. M. Euler, 146 N. Sixth St., Portland, Oregon |
| | C. S. Wright Co., 66 Temperance St., Toronto Ont., Canada. |

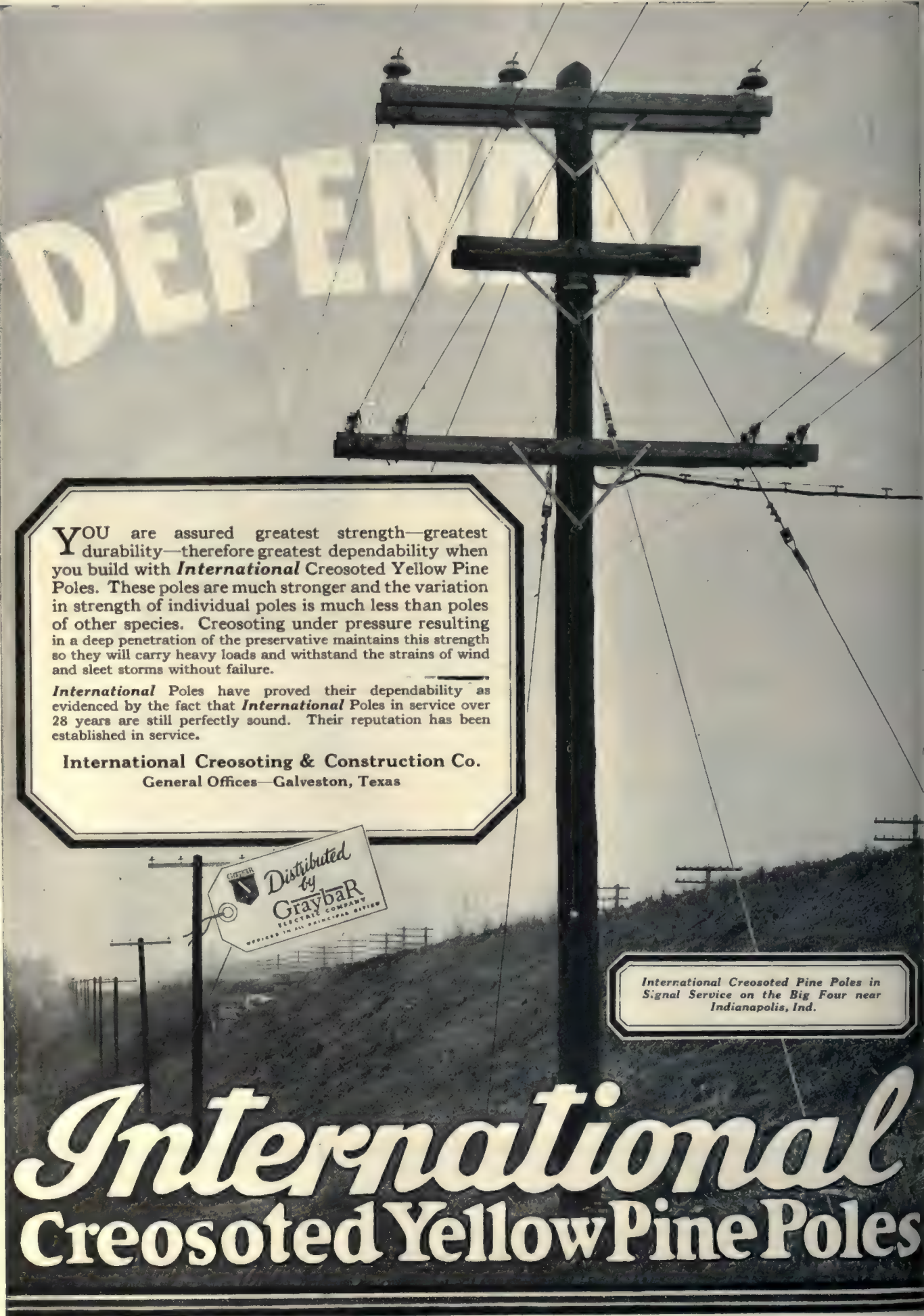


No. 392-A
(with plain cushion and back)



No. 392-EE

Hale and Kilburn SEATS




DEPENDABLE

YOU are assured greatest strength—greatest durability—therefore greatest dependability when you build with *International* Creosoted Yellow Pine Poles. These poles are much stronger and the variation in strength of individual poles is much less than poles of other species. Creosoting under pressure resulting in a deep penetration of the preservative maintains this strength so they will carry heavy loads and withstand the strains of wind and sleet storms without failure.

International Poles have proved their dependability as evidenced by the fact that *International* Poles in service over 28 years are still perfectly sound. Their reputation has been established in service.

International Creosoting & Construction Co.
General Offices—Galveston, Texas

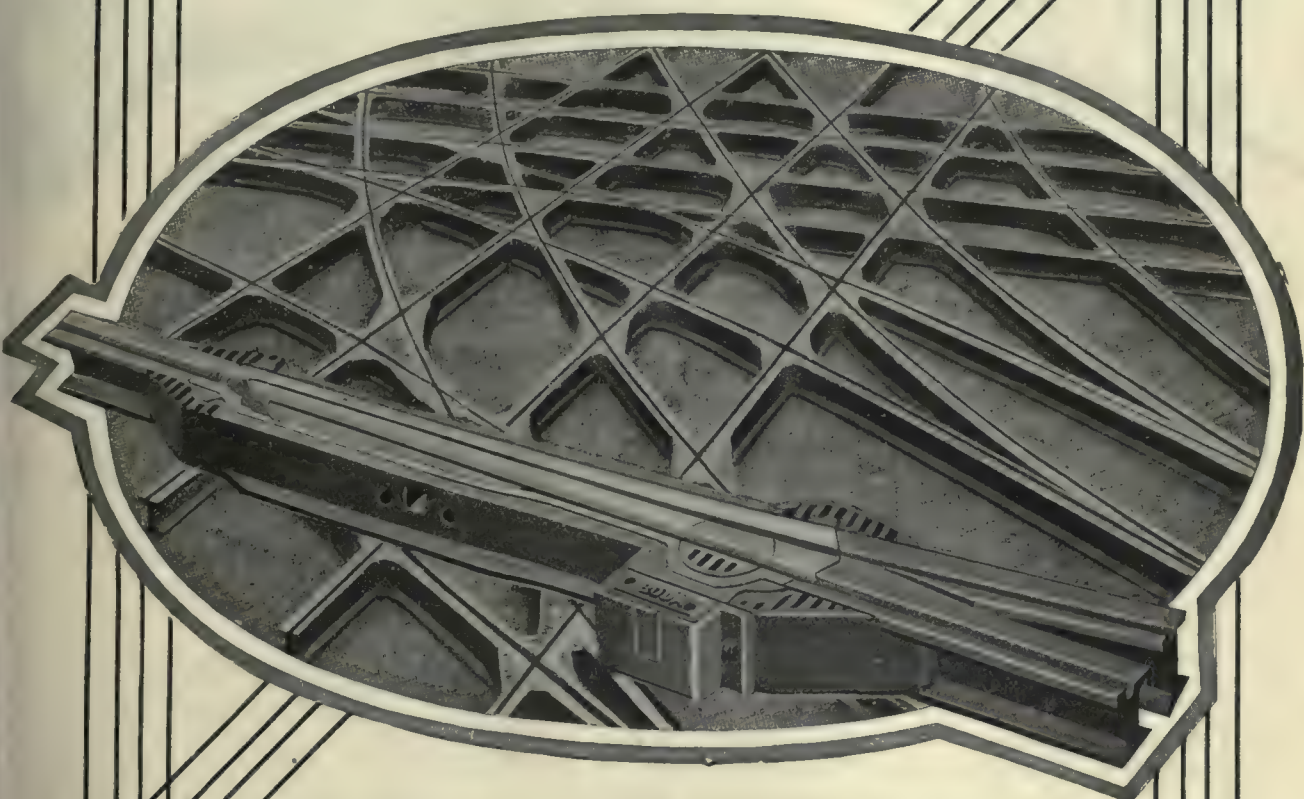
 Distributed by
Graybar
ELECTRIC COMPANY
OFFICES IN ALL PRINCIPAL CITIES

*International Creosoted Pine Poles in
Signal Service on the Big Four near
Indianapolis, Ind.*

International
Creosoted Yellow Pine Poles

BUDA

ESTABLISHED
1881



SPECIAL TRACKWORK

—of every description

*—built to your specifications—with BUDA
guarantee of workmanship backed by forty-
seven years' experience*

THE BUDA COMPANY

HARVEY [Chicago Suburb] ILLINOIS

**For
the
good
of the
service**



ANDERSON LINE MATERIAL

Over forty years of experience is behind the Line Material made by Anderson.

New and improved material was and is designed and constructed—ever keeping pace and supplying the needs and requirements of the Electric Railway industry as occasion demands.

Line material built for dependability and service with that intimate knowledge of the work it has to do, is the kind to install when real maintenance is considered.

The wide range of material made by Anderson gives you the opportunity to select a uniform, reliable standard to meet your particular local conditions.

If however you cannot find exactly what you want we will be glad to make it for you; we are particularly well-equipped to design and manufacture unusual or out-of-the-ordinary overhead material.

THE new Bulletin No. 39 is profusely illustrated and contains over one hundred pages. Many types for the "Good of the Service" are shown; weights, dimensions and detailed descriptions are given of the respective items listed and much other valuable information of use to the maintenance department of Electric Railways. Send for your copy of Bulletin No. 39 today.

Albert & J. M. Anderson Manufacturing Co.

289-305 A Street, Boston, Mass.

NEW YORK

CHICAGO

PHILADELPHIA

LONDON



The 5 o'Clock Rush

Thousands of feet hurrying toward the tracks that lead to *home*; thousands of minds centered on *home*; thousands of tired men and women depending on electric railway service to get them *home*.

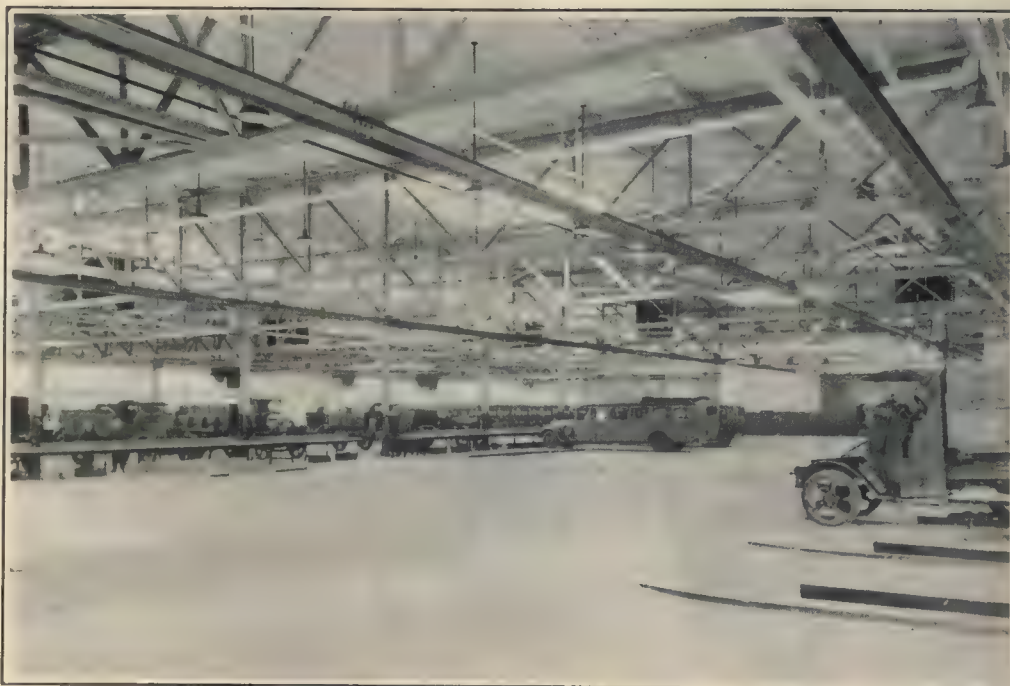
And electric railway service seldom fails them!

..... GARY WHEELS play an important part in the dependability of electric railways because, being of *wrought steel*, they combine the advantages of forging with those of rolling. They are made in a modern plant and rigidly inspected at every stage of manufacture. Their increasing use is the best evidence of their quality.

Illinois Steel Company

General Offices: 208 South La Salle Street
Chicago, Illinois





This garage building
is HEATED at a fuel
cost of \$580 a year

AND

this is only a part of
our engineering and
construction service
to street railways that
are co-ordinating
rails and rubber

THE building is one of five owned and operated by the Mack-International Motor Truck Corporation for which we designed the mechanical and electrical equipment. It is 180' x 350'. The height ranges from 26' to 35'. Glass skylights and side windows are extensive. Yet, the fuel bill for the winter of 1927-1928 will be less than \$580, based on fuel costs to March 1st. The other service garages are establishing proportionate records.

E. H. Faile & Co. is an organization of engineers who combine a knowledge of design, construction and operation of buildings. We offer a complete service, either in the economical adaptation of old car barns to modern conditions of motor bus operation or in entirely new construction.

We will be glad to study your problems with the view of submitting recommendations without obligation on your part.

E. H. Faile & Company

Engineers

441 Lexington Avenue

New York City

Is there
any
answer
to this


PROBLEM

Joints which are worn down! Joints which are loose! Cupped ones and broken ones! These, it seems, you have always with you.


And the ill-effects resulting, such as rough-riding, noise, holes in paving, and other troubles will soon counteract any good effects you may expect from de luxe cars and other modernized rolling stock.

Is there any answer? And if so, who can tell it to you?


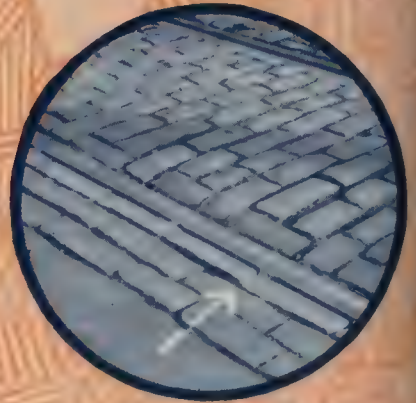





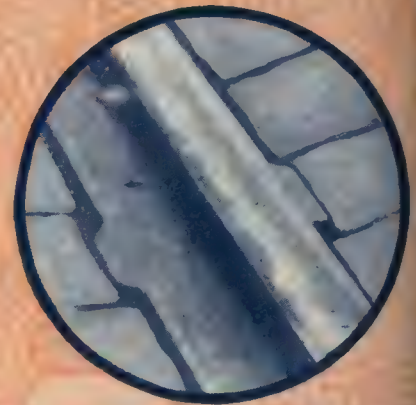
There *is* an answer
to the bad joint
problem—



In fact there's no
excuse for bad joints
anyway—



Every joint—new or
old—should be as
good as this—



You ought to fix 'em
once and for all—



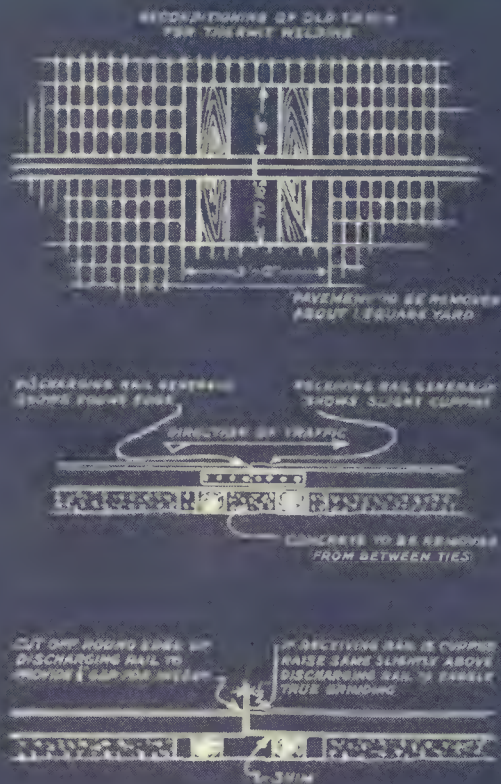


But the problem is *an engineering one*

The answer will not be found in terms of price or prejudice. Personal preferences alone, may not lead to a correct solution. Offhand judgment may be faulty. A Board of Directors can be just as wrong as a purchasing department.

Go to the Engineer—the experienced maintenance-of-way man for the answer to this one. He knows—or has the trained mind to secure and analyze the facts. His judgment is most likely to be correct.

We are confident that your Engineer will say—“Eliminate the joints by Thermit Welding.”



Old Track can be made as good as new

Many a piece of track is called "old" and worn out, long before the actual wearing life of the rail itself is reached. It's ninety per cent a question of condition of joints. Eliminate the bad joints from any rail and you'll have a piece of track which rides as smoothly as new.

Thermit is an economical proposition, whether for one joint or a thousand, for new construction or for repairs on old track. Any joint, once Thermit Welded, is finished for good and all, and should last without repair as long as the rail itself.

Let us figure on your Spring maintenance program.



METAL & THERMIT CORPORATION
120 BROADWAY, NEW YORK, N.Y.



Full Running Speed

THE speed time curve tells the story. Quick starts and quick stops increase the average speed. Area A has been reduced by improvements of power. Area B has been decreased by improvements in braking apparatus and brake shoes. Area C has increased as a result of decrease in Area A and B. The use of Diamond S shoes will increase the average train speed.

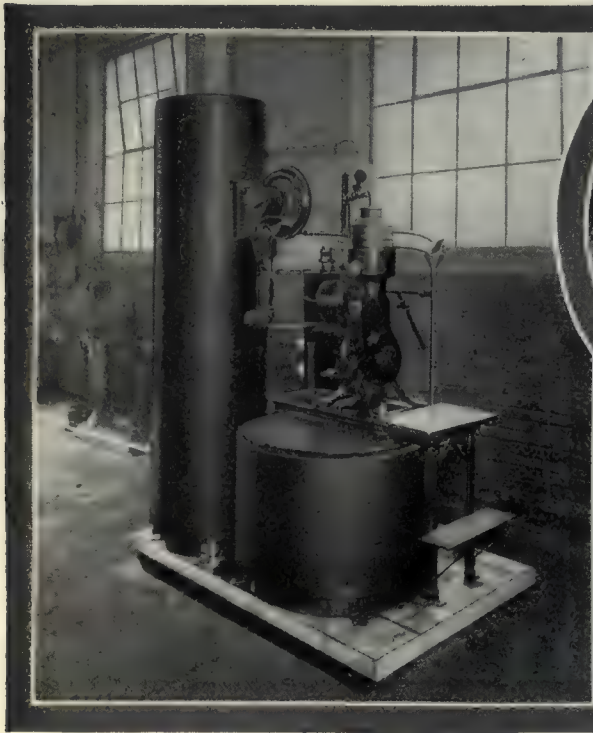
"Best by Test"

THE AMERICAN BRAKE SHOE AND FOUNDRY COMPANY

30 CHURCH ST., NEW YORK
332 SO. MICH. AVE., CHICAGO

CLEANER OIL

reduces bus operating costs



The De Laval Crankcase Oil Reclaiming Outfit in the garage of the Central Transportation Company, Trenton, N. J., is shown at the left.

BASED on the generally accepted fact that poor lubrication is responsible for 75 to 80% of all automotive repairs, and for a great reduction in the useful life of the motor, it can be easily proved that the extra wear and tear resulting from the continued use of dirty, diluted oil costs 400 to 1000% more than the oil itself.

There is no longer an excuse for inefficient lubrication! Even oil costs can now be greatly reduced! The De Laval Crankcase Oil Reclaiming Outfit renews old oil at a fraction of its cost—removes carbon and other impurities—restores its viscosity—its ability to lubricate and resist heat—makes it still more economical to use the best oil and change every few hundred miles.

This Outfit has passed the rigorous tests de-

vised by several of America's leading engineering organizations. Of still greater importance it has passed the test of actual commercial operation in many garages.

Lubrication engineers declare that the efficiency of De Laval reclaimed crankcase oil is fully equal to that of the original oil as it comes from the refinery and the experience of users bears this out. Some go so far as to say that oil reclaimed with the De Laval is actually *better than new!*

If you operate 15 or more vehicles it will pay you to write for further information. Ask for Bulletin 108-R.

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 600 Jackson Blvd., Chicago
DE LAVAL PACIFIC COMPANY, San Francisco
ALFA-LAVAL CO., Ltd., 34 Grosvenor Road, London, S. W. 1.

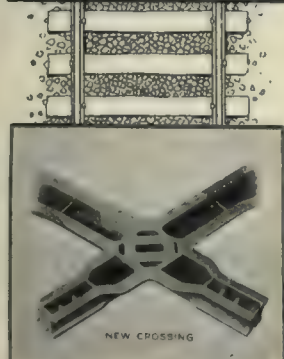
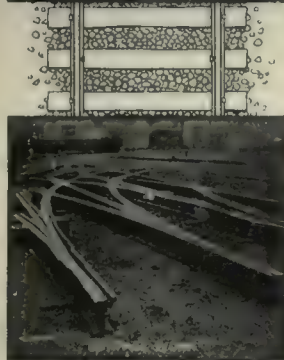
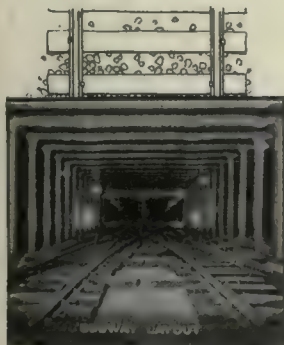
DE LAVAL

Centrifugals

WHARTON

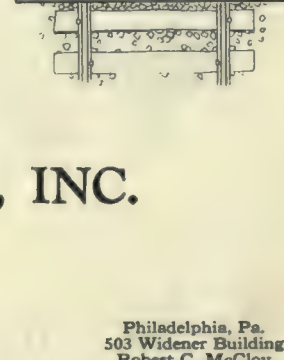
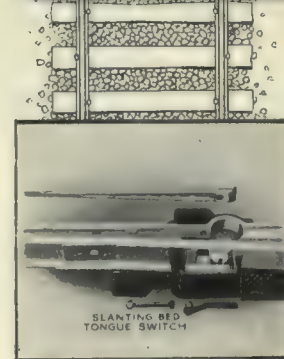
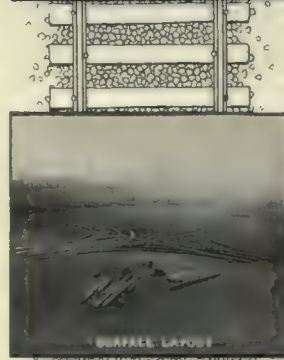
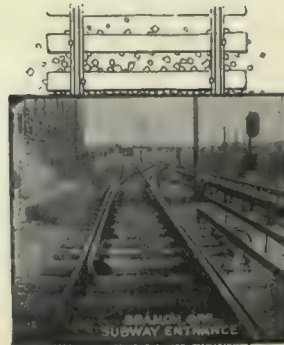
Tisco

Special Trackwork



Whether it is a complicated layout for Subway or Surface Lines, or only a single piece, Wharton Tisco Manganese Steel Special Trackwork is built to withstand the severest service.

Have you obtained your copy of our four-page letter, describing and illustrating our New Scientifically Designed Crossing—our latest contribution to the Art of Special Trackwork Manufacture? If not, it will be sent on request.



WM. WHARTON JR. & CO., INC.
EASTON, PA.

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G. V. Wood

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Charles N. Shaffner

Chicago, Ill.
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H. F. McDermott

Montreal, Que., Canada
10 Cathcart Street
Lamoreux-Kelly, Ltd.

Pittsburgh, Pa.
1418 Oliver Building
James R. Smith

El Paso, Texas
207 San Francisco St.
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522 Connell Bldg.
J. A. MacFadyen

Philadelphia, Pa.
503 Widener Building
Robert C. McCloy

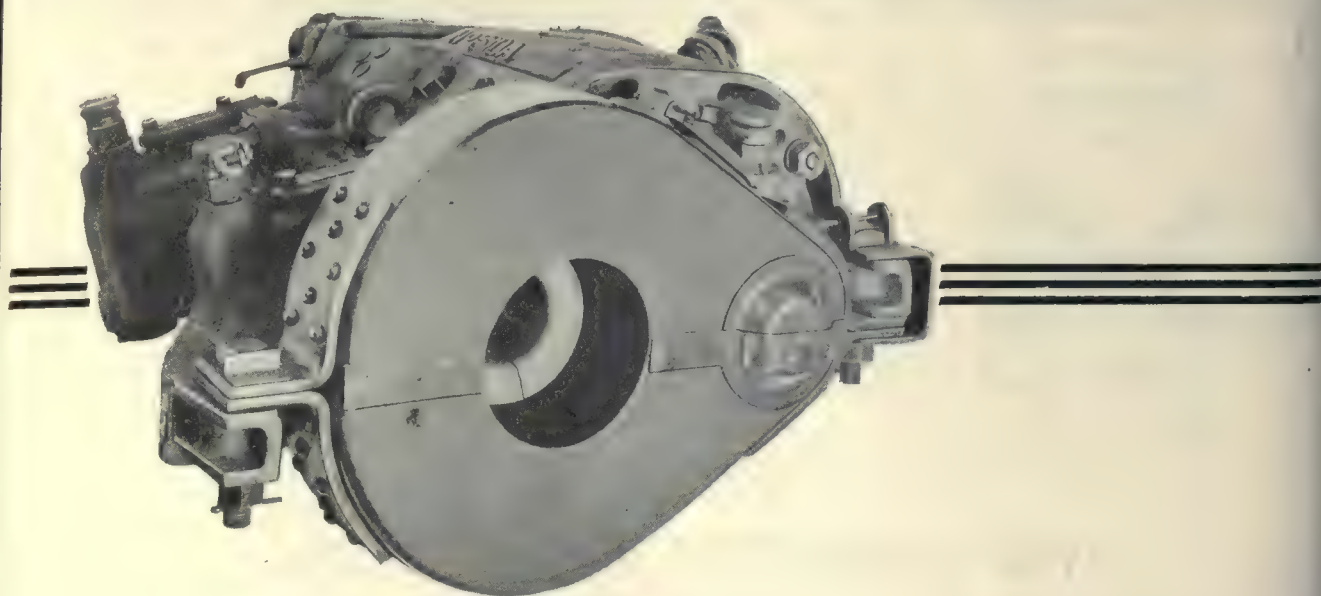
Boston, Mass.
948 Old South Building
Charles N. Wood Co.

The Best Grease in the World Makes as Good a Grinding Compound as the Poorest If Adequate Protection Against Dirt Is Not Provided

ONE Piece Gear Cases, built by Chillingworth, provides utmost gear protection.

- 1—They absolutely prevent the entry of DIRT and the escape of grease, because they are seamless, with overlapping joint between the halves.
- 2—They WEAR longer because they are built of tough and durable deep drawing steel and are supported by strong malleable iron brackets.
- 3—They insure against VIBRATION because there are no rivets to work loose.

Ask any of the nation-wide users of Chillingworth drawing Steel Seamless Gear Cases about their superior merits. We'll gladly furnish you samples for inspection and comparison.



W. H. 510-A Motor

Chillingworth Manufacturing Co.

Jersey City, N. J.

Representatives:

Tool Steel Gearing & Equip. Co.
England

Railway & Power Eng. Co.
Canada

J. W. Gerke
New York



A corner of the Bethlehem Frog and Switch Assembly Shops at the Steelton Plant, Steelton, Pa.

TRACK LAYOUTS *that* ASSEMBLE EASILY

At the Bethlehem Frog and Switch Plant every special track layout is completely assembled in well lighted and heated shops before shipment. The fact that the work is done under cover, with the men protected from the elements, has the advantage of assuring the maximum of care and accuracy

in the fitting of the parts. This, in turn, means complete freedom from annoying delays in the field due to an incorrect trial assembly.

Orders for any kind of standard or special trackwork will be accorded immediate attention and filled promptly.

Partial List of Bethlehem Railway Equipment

Special Trackwork
Special Splice Bars
for welding
Girder Rails
Tee Rails

Machine Fitted Joints
Pole Line Material
Abbot and Center
Rib Base Plates
Tie Plates

Rolled Steel Wheels
Hard Center Frogs
Forged Axles
Tie Rods
Bolts

BETHLEHEM STEEL COMPANY, General Offices: BETHLEHEM, PA.

DISTRICT OFFICES:

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh Buffalo
Cleveland Detroit Cincinnati Chicago St. Louis San Francisco Los Angeles Seattle Portland
Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporters of Our Commercial Products.

BETHLEHEM



Specify

Steel Axles

Steel Springs

Armature Shafts

**Rolled Steel
Wheels**



STANDARD
Philadelphia, Pa.

Works:
Burnham, Pa.

'STANDARD'

constant operation through crowded city streets—thousands of quick stops and long inter-urban runs at speedy schedules—

Conditions of this kind impose hard wear and heavy stress on wheels and axles. They are conditions which *demand* the safety factors and long wear you find in "Standard" Steel.

STEEL WORKS COMPANY

Branch Offices:

CHICAGO
ST. LOUIS

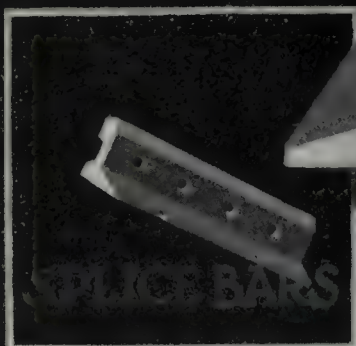
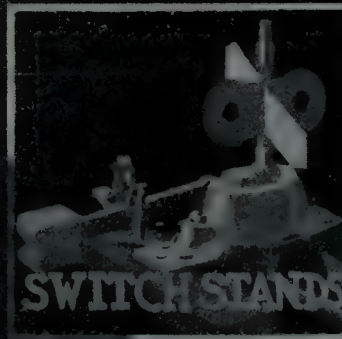
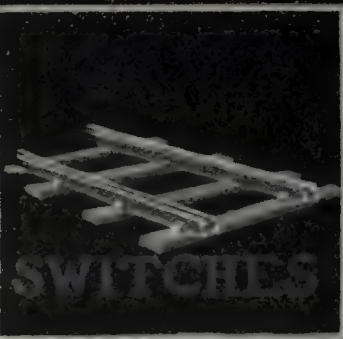
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PIN TERMINAL RAIL BONDS



View of 20th Century rounding bend at Marblehead. The New York Central is always among the leaders in modern equipment. Insert shows our type CPO1 Bond used on all main line tracks

BECAUSE of the ease of installation, Pin Terminal Rail Bonds are used on many of the larger railway systems. They are accessible for inspection, show low maintenance cost, insure strong contact and low resistance.

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- 650-lb. Wheel for 30-ton cars
- 700-lb. Wheel for 40-ton cars
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Time—Proven

Since the Chilled Tread Wheel was first put into service in 1850, wheel loads have increased eight hundred per cent. One wheel in heavy duty now carries the load that was then distributed among eight. Yet today as a result of scientific laboratory and foundry

programs, the Chilled Tread Wheel provides a higher factor of safety than at any time in the past.

Have you investigated the advantages of the new design single plate wheel? Over 206,000 in service.

Chilled Tread Wheels



ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCORMICK BUILDING - CHICAGO

"Rail vibration is absorbed..."

maintenance costs are reduced"

"FOR a long time we studied the problem of how best to overcome the harmful effects of rail vibration," said Mr. H. A. Abell, Engineer of Way & Structures of the New York State Railways. "Much of our street pavement here in Rochester is asphalt, and we have found that, under ordinary traffic conditions, the pavement next to the rail disintegrates rather rapidly.

"In 1924 we made our first test installation of an asphaltic rail filler or cushion, next to the rail. The results of this trial have been most satisfactory. We have found that the asphaltic cushion effectively absorbs vibration and protects the pavement. And we have also noticed a considerable reduction in noise.

"We now have about two and a half miles of double track insulated in this way. This year we shall install nearly two miles more. In fact, this is now standard construction in the case of asphaltic and macadam pavement. We consider it an economy because of the notable reduction in maintenance costs."

* * * * *

And the "asphaltic cushion" described by Mr. Abell is the Carey Elastite System of Track



H. A. Abell, Engineer of Way & Structures of the New York State Railways, at Rochester, N. Y. Mr. Abell has had long experience in dealing with electric traction problems, for the past ten years with the New York State Railways, and prior to that with the Schenectady Railway Co.

Insulation. This remarkable improvement in track construction means not only real savings in maintenance, but also smoother, quieter operation. The Carey Elastite System of Track Insulation is now being adopted by leading traction engineers all over the country. Full information on request.

THE PHILIP CAREY COMPANY, Lockland, CINCINNATI, O.

Carey Elastite
TRADE MARK REGD. U.S. PATENT OFFICE



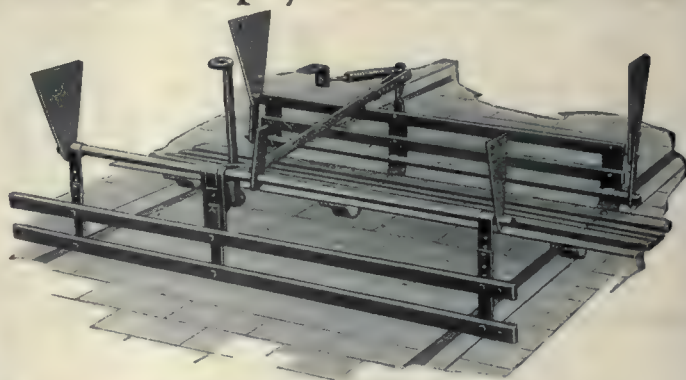
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Safety and Service

ROOT Specialties help you maintain both

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This is probably the simplest and most efficient life guard ever devised. The "basket" springs to the pavement instantly when the "gate" is struck, and no object can get under or through it. Simple, and of very sturdy construction, the initial cost of the Root Life Guard is low and maintenance negligible.



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Either the Short Blade Scrapers illustrated or the No. 6 Scraper, for removing snow the entire width of the track, will clean the tracks of snow and ice with a minimum of attention, and regardless of irregularities in track or roadway. They are being used by over 80% of the electric railways in the United States.

Bulletins and quotations on request. Demonstrations gladly arranged.

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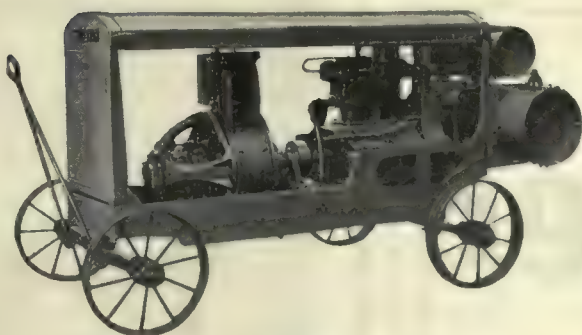


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PRACTICE

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THE RAIL JOINT CO.
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"L-7" Rotator
Rock Drill
Catalog
3281-S



"WK-322", 103-Ft. Compressor on Steel Wheels
Compressor Catalog, 3283-F



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"DH-361"
Clay Spade
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Air Power Equipment

For Track Maintenance

For construction and repair work out on the track, Sullivan Vibrationless Portable Compressors are available in two electric models—and in 4 gasoline engine models, capacities from 103 to 310 cu. ft. per min., for 100 lbs. pressure. Mountings are steel wheels, rubber-tired trailer trucks, skids, or motor trucks.

The 103-ft. compressor will run a heavy concrete breaker, or 2 tampers, or 4 riveters, or 4 clay diggers, or a rock drill. *Catalog 3283-F.*

Sullivan Air Tools

Sullivan Rotator Rock Drills, Concrete Breakers, and Clay Spaders are convenient air tools for drilling rock, cutting concrete, or digging hard clay.

Send for "Speed Up With Air"

Sullivan Portable Hoists

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The economy and versatility of air power make it especially adapted to maintenance work of electric railway properties.

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With new uses for air power constantly arising, and the force of men dependent on air power constantly increasing, dependability in your compressor is a paramount consideration.

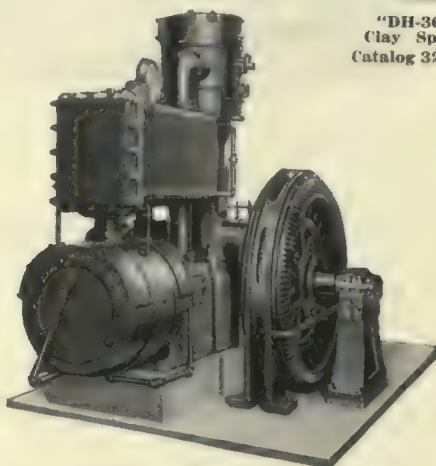
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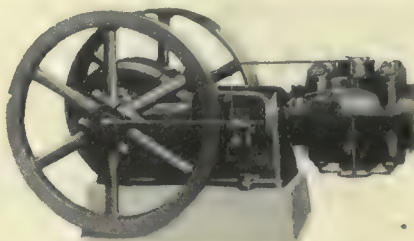
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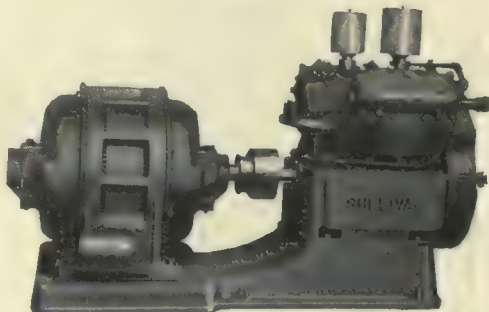
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In that way even the forgetful remember not to forget what they've been told.

Which may explain why we use the three-link symbol behind the subjoined word Morganite.

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Los Angeles, Electrical Engineering Sales Co., 502 Delta Bldg.

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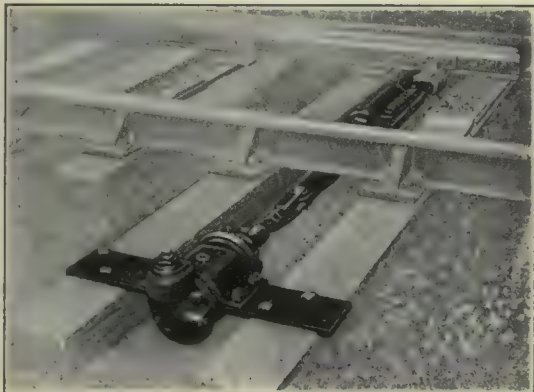
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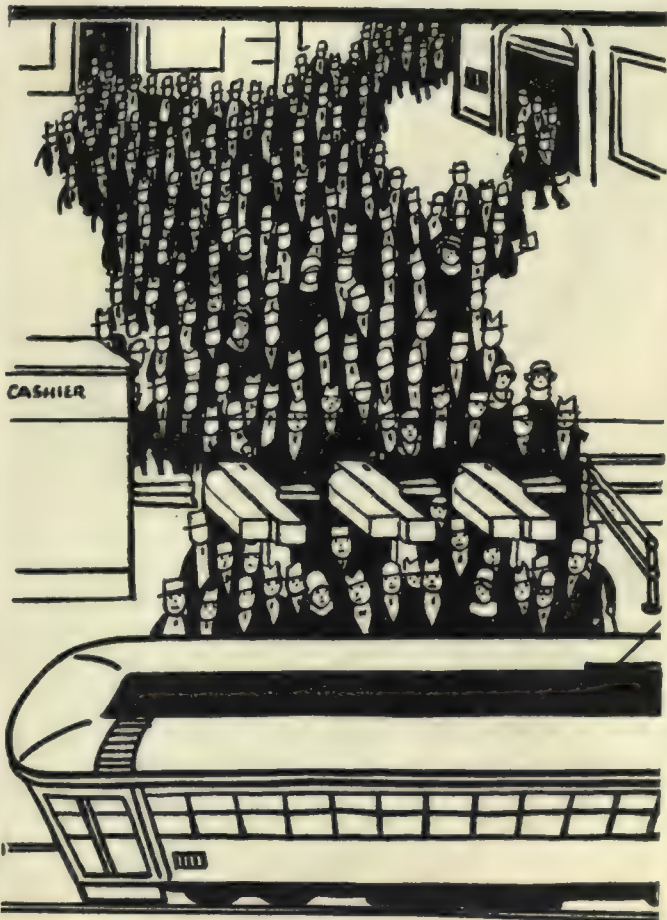
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Collecting fares; counting and controlling passengers—this can now be done more efficiently, more accurately and more honestly by machine than by man power—and at much less cost.

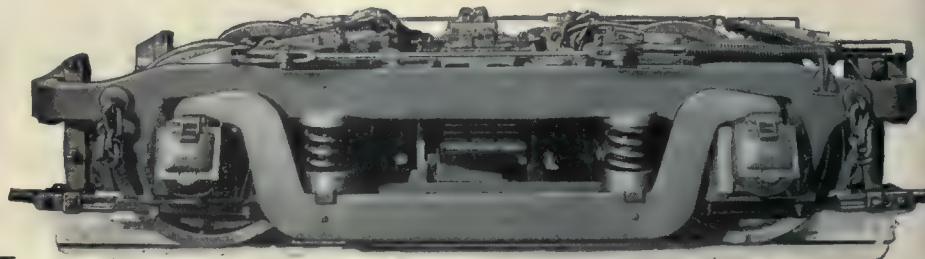
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Makers of PEREY Passimeters and Turnstiles



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Frame with cross end transoms combined in one strong casting.

COMMONWEALTH Devices are backed by an engineering and designing skill of such high grade as to assure perfect products. They are standard equipment on many railroad cars and Locomotives. The Commonwealth Motor Truck, due to its faultless construction and performance, leads the field for which it is designed.

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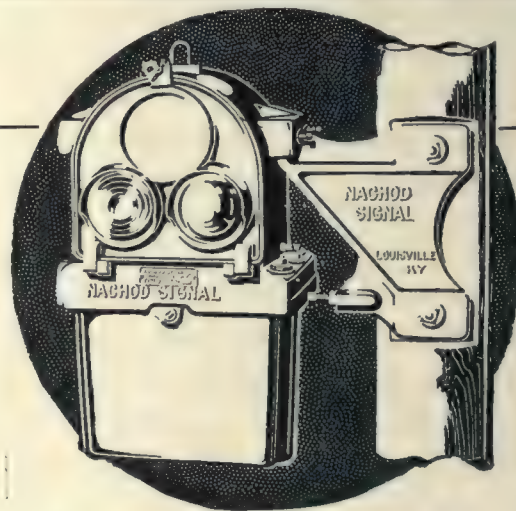
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THE pole simply can't escape—if you have Earll Catchers and Retrievers on the job! These devices have the pole below the danger line in a jiffy—and hold it there.

Never-failing, positive in operation, powerful mechanism, years of service! And don't forget the 5 Chief Points of Superiority

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2. "Free Winding Tension Spring" handles wet rope efficiently.
3. "Ratchet Wind" makes retriever operation easy.
4. "Emergency Release" great convenience and added safety.
5. "Perfect Automatic Lubrication of every part."

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Catchers and Retrievers



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Out of the Repair Shop In Record Time!

In car shops, where every hour that rolling stock is held up for repair is costly, the speed of a Binks Sprayed job is a worthwhile advantage.

Yet, speed is not all. The quality of a Binks Sprayed finish is supreme. Working close to the surface, the usual evaporation in the average spray is eliminated, spray-waves are avoided; hand-rubbing and retouching time is saved.

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Install just one Binks Spray Painting Unit for finishing and refinishing cars both inside and out,—for spray-painting equipment and for maintenance of way. Compare the unusual time and quality results of "Binks" with any make regardless of price. Then, if you are not completely satisfied that Binks can serve you best, return the outfit at the full purchase price. Write for details.

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*Time is the great test.
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permanent insulation
known is*

KERITE

KERITE INSULATED COMPANY
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are good for
business!**



WASHING your cars regularly with Oakite Materials keeps them looking their best—inviting to the public who patronize your service. It is good for business!

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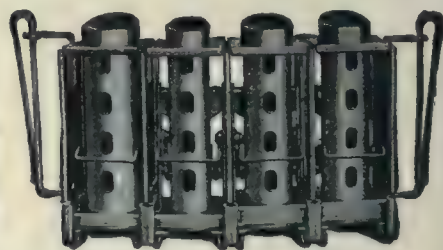
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Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

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Johnson Fare Box Co.

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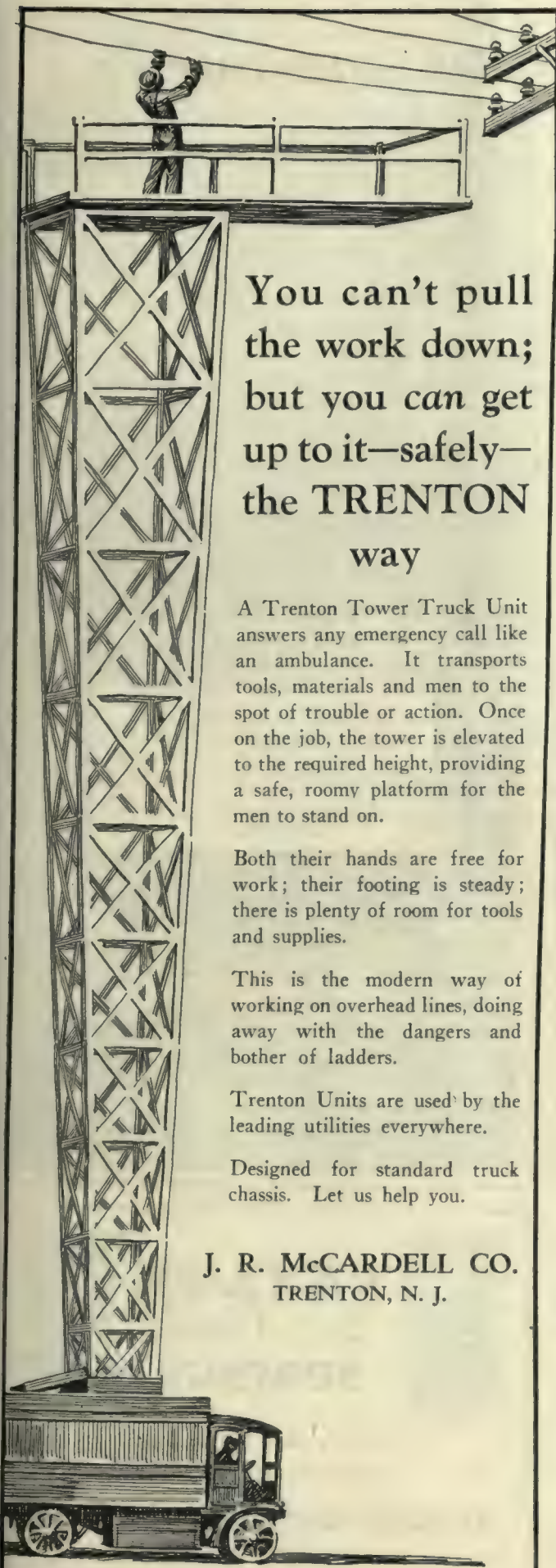
They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000 Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

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way**

A Trenton Tower Truck Unit answers any emergency call like an ambulance. It transports tools, materials and men to the spot of trouble or action. Once on the job, the tower is elevated to the required height, providing a safe, roomy platform for the men to stand on.

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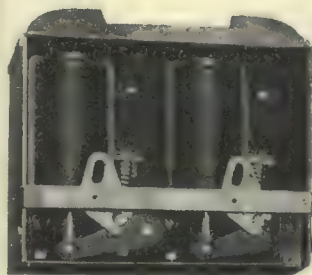


R-11 Double Register

**Cost no
more**

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Saving in Operating Costs



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International Electric Backs have been in service long enough to record a million fares without noticeable wear on working parts. Solenoids, using a line current of 350 to 650 volts D.C. operate these backs.

Convenient— Fast Operation

is facilitated through the compact, well insulated foot switch shown, which speeds up passenger loading.



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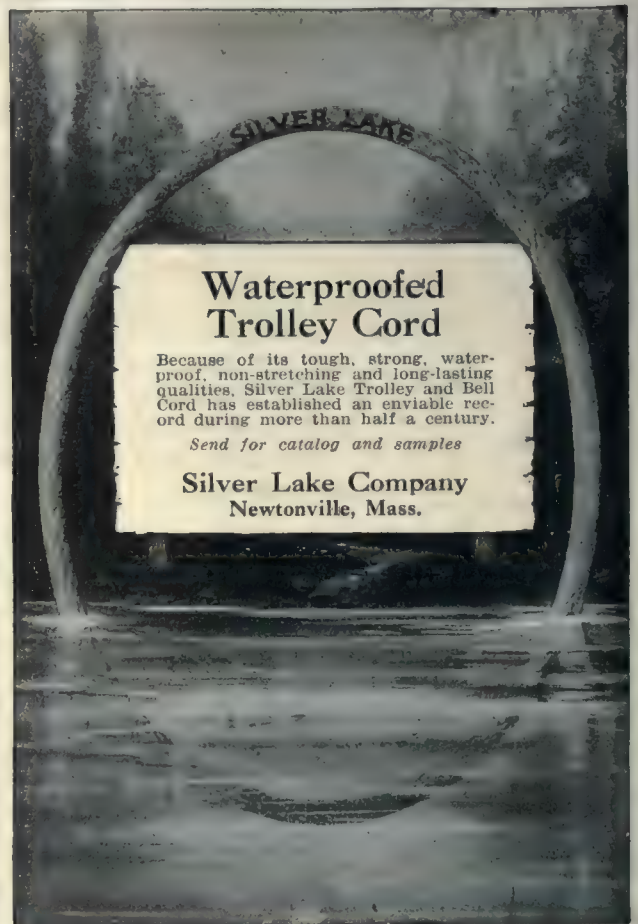
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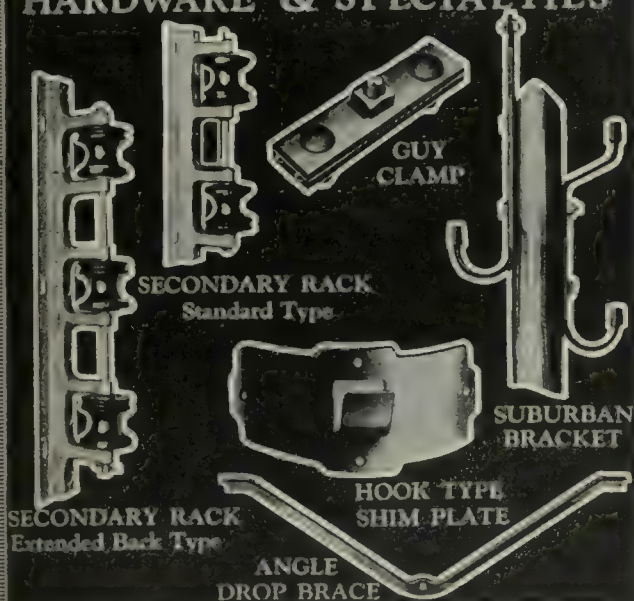


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WHY let Mother Nature grow grass between the wheels of replaced cars? Why pile up rails, shop equipment, power plant equipment, line equipment, car appliances, road building material, etc., etc., you will never use again?

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Testing Machine

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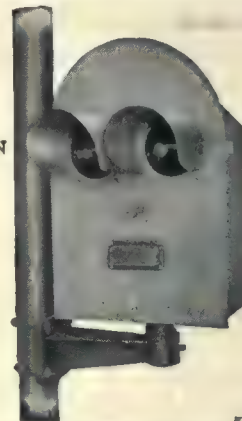
Pacific Coast Representative:

United States Steel Products Company
Los Angeles Portland San Francisco Seattle

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—are no longer operating problems. We can show you how to take care of both with one equipment. The Peter Smith Forced Ventilation Hot Air Heater will save, in addition, 40% to 60% of the cost of any other car heating and ventilating system. Write for details.

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For Immediate Delivery

2000 to 3000 kva. total, 60 to 25 cycles (true) frequency changer in one or several units, 60 cycle, voltages 13,200, 6600 or 2200; 25 cycle voltage 2200. Must be in good operating condition and if possible include starting compensator.

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W-96, Electric Railway Journal, Tenth Ave. at 36th St., New York City

TO HELP YOU

GET WHATEVER YOU NEED

"Searchlight" Advertising

EQUIPMENT WANTED

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20—Steel or semi-steel center entrance cars, to be used as trailers; would consider double end cars.
20—G. E. 203 A or P motors.
120—Modern 35 or 40 hp. motors that can be mounted on trucks with 26" whls, 5" axle bore.
Write for our latest bulletin of modern equipment for sale!

THE IRVING S. VAN LOAN CORP.
1819 Broadway, N.Y.C. Telephone Columbus 1257

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COMPANY serving bus and railway industry has opening for draftsman who can originate as well as figure costs, estimate, etc. State salary expected and what experience. P-98, Electric Railway Journal, Tenth Ave. at 36th St., New York.

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A TRACK superintendent. Associate member American Society Civil Engineers. Qualified by technical training and over 15 years' practical street railway track experience. Full charge as superintendent in field of over 300 men, steam shovels, concrete mixers, welding, grinding and acetylene outfits. With one of the largest street railways 15 years. Successful handling men and work. PW-97, Electric Railway Journal, Tenth Ave. at 36th St., New York.

GENERAL superintendent or manager; successful; seeks connection with a future. PW-77, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT of equipment, M. M. of long experience, desires to make change. PW-89, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation, broad experience, successful record, wishes to correspond with managers needing services of a successful transportation man. Twenty years' experience city and interurban railways and buses; exceptional ability dealing with labor, public, increasing revenue, decreasing operating costs. High grade references. PW-92, Electric Railway Journal, 1600 Arch St., Philadelphia, Pa.

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RAILS

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Quick Delivery Lowest Price

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Peoples Gas Building

St. Louis CHICAGO San Francisco

TO HELP YOU

SELL USED EQUIPMENT

"Searchlight" Advertising

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Advertising, Street Car
Collier Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Air Brake Co.

Air Circuit Breakers
Roller-Smith Co.

Air Receivers and Aftercoolers
Ingersoll-Rand Co.

Ammeters
Roller-Smith Co.

Anchors, Guy
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Wks.
Elec. Service Supplies Co.

Automatic Return Switch
Stands
Ramapo Ajax Corp.

Automatic Safety Switch
Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Cincinnati Car Co.
Illinois Steel Co.
Standard Steel Works Co.
Taylor Electric Truck Co.
Westinghouse E. & M. Co.

Axles, Front
Shuler Axle Co.

Axles, Steel
Bethlehem Steel Co.

Babbit Metal
National Bearing Metals Corp.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.

Batteries, Dry
National Carbon Co.
Nichols-Lintern Co.

Batteries, Storage
Electric Storage Battery Co.

Bearings, Anti-Friction
Hyatt Roller Bearing Co.
Timken-Roller Bearing Co.

Bearings, Ball
Norma-Hoffmann Bearings Corp.
SKF Industries, Inc.

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Bemis Car Truck Co.
Cincinnati Car Co.
Columbia Machine Wks.
Drew Elec. & Mfg. Co.
National Bearing Metals Corp.
Taylor Electric Truck Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Cincinnati Car Co.
Stucki Co., A.

Bearings, Roller and Ball
Hyatt Roller Bearing Co.
Norma-Hoffmann Bearings Corp.
SKF Industries, Inc.
Timken Roller-Bearing Co.

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Consolidated Car Heating Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks.
Elec. Service Supplies Co.

Benders, Rail
Railway Trackwork Co.

Blowers (Hand Portable)
Ideal Commutator Dresser Co.

Bodies, Bus
Bender Body Co.
Brill Co., The J. G.

Cummings Car & Coach Co
Fitzjohn Mfg. Co.
Lang Body Co.

Body Material—Haskelite & Plymetl
Haskelite Mfg. Corp.

Rollers
Babcock & Wilcox Co.

Bolts & Nuts, Track
Illinois Steel Co.

Bond Testers
American Steel & Wire Co.
Elec. Service Supplies Co.
Roller-Smith Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Electric Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Electric Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Brackets and Cross Arms
(See also Poles, Ties, Posts, etc.)
Columbia Machine Wks.
Electric Railway Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Railway Appliance
Westinghouse Traction Br. Co.

Brake Shoes
American Brake Shoe & Foundry Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Taylor Electric Truck Co.

Brake Testers
National Railway Appliance Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co.
Westinghouse Traction Brake Co.

Brakes, Magnetic Rail
Cincinnati Car Co.

Brick, Paving
National Paving Brick Mfrs. Assn.

Brick, Vitrified
National Paving Brick Mfrs. Assn.

Brushes, Carbon
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Morganite Brush Co., Inc.
National Carbon Co.
Stackpole Carbon Co.
Westinghouse E. & M. Co.

Brushes, Graphite
Morganite Brush Co., Inc.
National Carbon Co.

Brushes, Metal Graphite
National Carbon Co.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

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Columbia Machine Wks.
General Electric Co.

Bulkheads
Haskelite Mfg. Corp.

Bus Lighting
National Railway Appliance Co.

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Cummings Car & Coach Co.
Graham Bros.
International Harvester Co.
Versare Corp.
White Co., The

Buses, Gas, Electric
General Electric Co.

Bushings, Case Hardened and Manganese
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Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Wks.

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General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.

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National Carbon Co.

Carbon Plates, Welding
National Carbon Co.

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National Carbon Co.

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Westinghouse E. & M. Co.

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Cincinnati Car Co.
Irving Iron Works

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co.

Cars, Gas-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & Mfg.

Cars, Gas, Rail
Brill Co., The J. G.

Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.

Cars, Self-Propelled
Brill Co., The J. G.

Castings, Brass Composition or Copper
Anderson Mfg. Co., A. & J. M.
Cincinnati Car Co.
Columbia Machine Wks.
National Bearing Metals Corp.

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American Steel Foundries
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Columbia Machine Works & Standard Steel Works Co.
Inc.
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Columbia Machine Wks.
Timken Roller-Bearing Co.

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Earl, G. I.

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Haskelite Mfg. Corp.

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Heywood Wakefield Co.

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Electric Service Supplies Co.

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Westinghouse E. & M. Co.

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Columbia Machine Wks.
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Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Oakite Products, Inc.

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(See also Snow-Plows Sweepers and Brooms)
Brill Co., The J. G.
Cincinnati Car Co.
Root Spring Scraper Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
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Elec. Service Supplies Co.
Westinghouse E. & M. Co.

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Columbia Machine Wks.
Economy Electric Devices Co.
Ellcott Thompson Electric Co.
General Electric Co.
Westinghouse E. & M. Co.

Colls, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

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Illinois Motive Equipment Co.
Johnson Fare Box Co.

Coin Counting Machines
Cleveland Fare Box Co.
International Register Co.
Johnson Fare Box Co.

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Cleveland Fare Box Co.
Johnson Fare Box Co.

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Cleveland Fare Box Co.

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Commutator Equipment
Ideal Commutator Dresser Co.

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Ingersoll-Rand Co.
Sullivan Machinery Co.
Westinghouse Traction Br. Co.

Compressors, Air Portable
Ingersoll-Rand Co.

Compressors, Portable
Sullivan Machinery Co.

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Sullivan Machinery Co.

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General Electric Co.
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General Electric Co.

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American Steel Foundries
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Cincinnati Car Co.
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Westinghouse Tr. Br. Co.

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Bethlehem Steel Co.
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Crossings
Wm. Wharton, Jr. & Co.
Ramapo Ajax Corp.
Inc.

Crossings, Track (See Track Special Work)

Crossings, Trolley
General Electric Co.
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Westinghouse E. & M. Co.

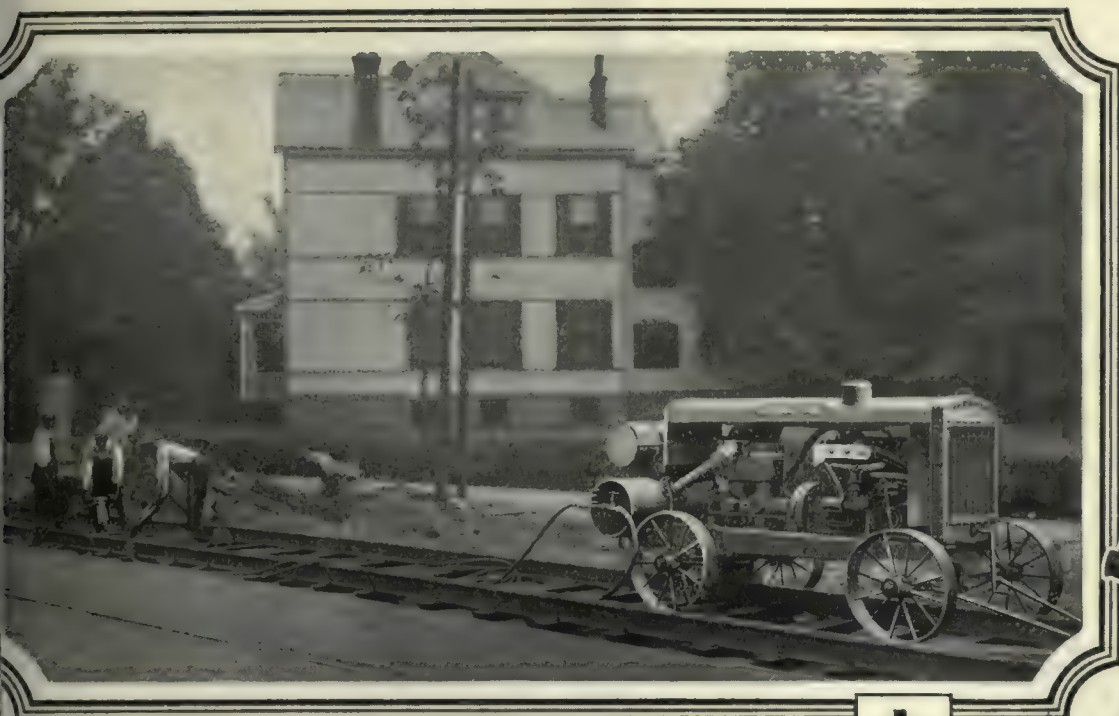
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Electric Railway Improvement Co.

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Railway Track Work Co.
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Westinghouse E. & M. Co.

(Continued on page 120)



Breaking out old concrete with CC Paving Breakers operated from portable air compressors.



Reducing Track Work Costs

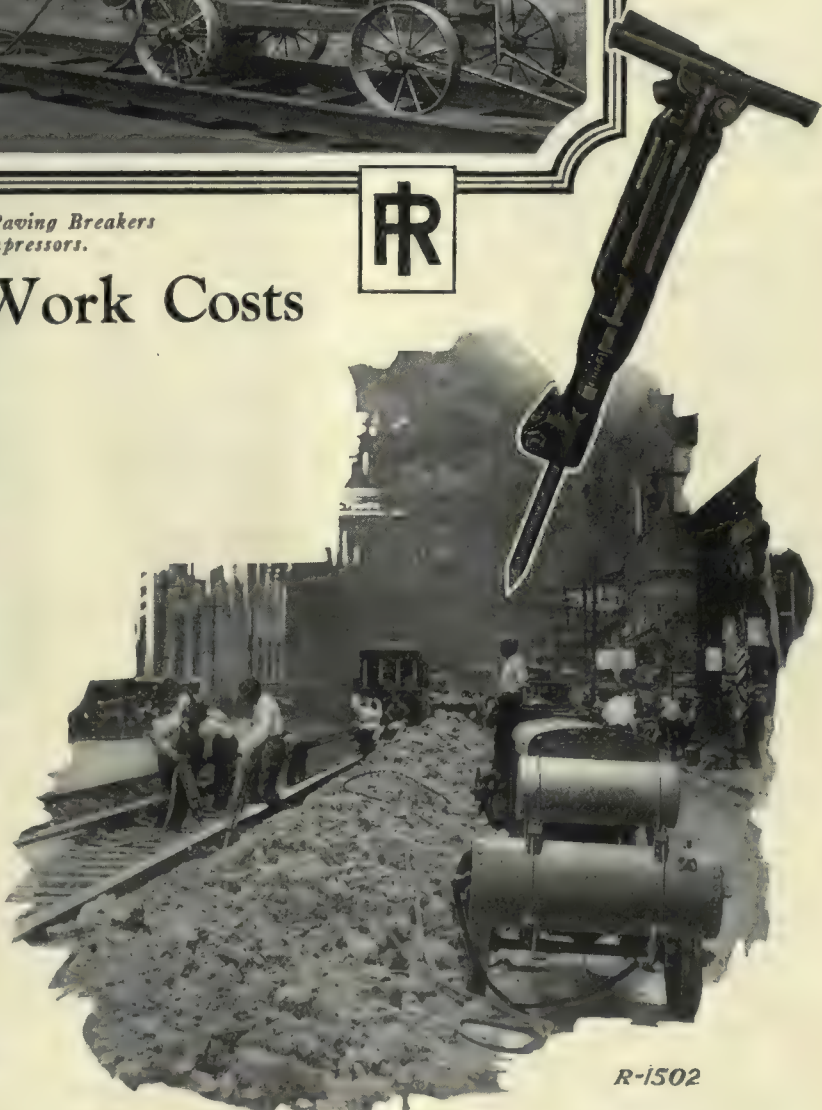
Costs are greatly lowered on many classes of work when Ingersoll-Rand compressed air tools are used to aid labor. For instance, pneumatic concrete breakers make it possible for 10 men to do as much work as a dozen men using ordinary hand methods.

New tools and new ways to help reduce the labor item are constantly being developed. It will pay you to investigate the complete line of Ingersoll-Rand labor-saving air tools for street and track work.

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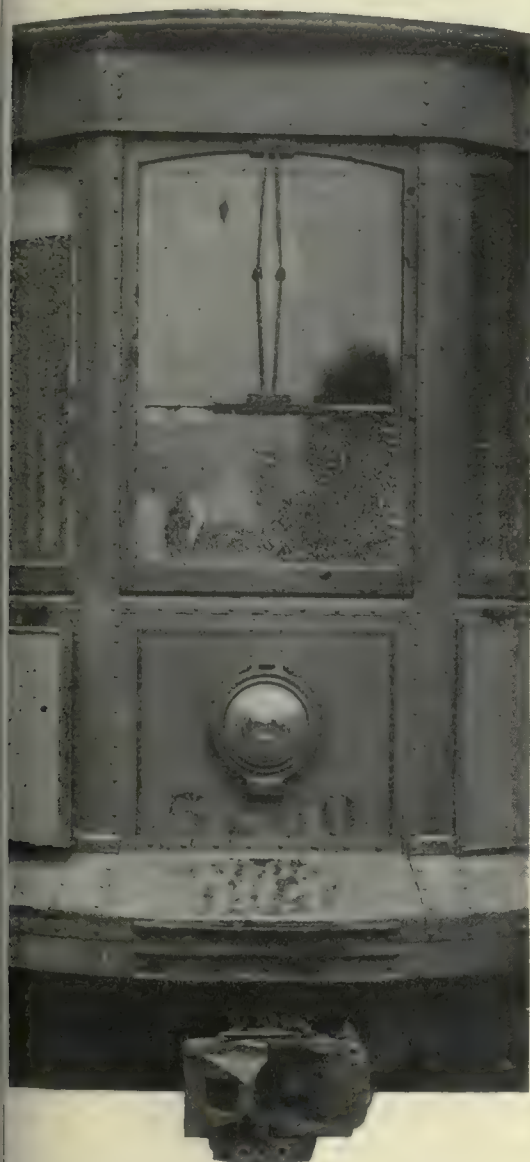
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For Canada Refer—
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16 Phillips Square, Montreal, Quebec



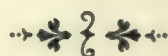
Ingersoll-Rand

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- Derailing Devices (See also Track Work)**
- Derailing Switches**
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- Destination Signs**
Columbia Machine Wks.
Electric Service Supplies Co.
- Detective Service**
Wish-Servise, P. Edward
- Door Operating Devices**
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Cincinnati Car Co.
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National Pneumatic Co., Inc.
Safety Car Devices Co.
- Doors and Door Fixtures**
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.
Safety Car Devices Co.
- Doors, Folding Vestibule**
National Pneumatic Co.
Safety Car Devices Co.
- Drills, Rock**
Sullivan Machinery Co.
- Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.
- Dryers, Sand**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Ears**
Columbia Machine Wks.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Electric Grinders**
Railway Trackwork Co.
- Electrical Wires and Cables**
American Steel & Wire Co.
Roebling's Sons Co., John A.
- Electrodes, Carbon**
Railway Trackwork Co.
Una Welding & Bonding Co.
- Electrodes, Steel**
Railway Trackwork Co.
Una Welding & Bonding Co.
- Engineers, Consulting, Contracting and Operating**
Beeler, John A.
Buchanan & Layng Corp.
Byllesby Eng. & Man. Corp.
Day & Zimmermann, Inc.
A. L. Drum & Co.
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLew
McClellan & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
- Engineers, Inspecting & Chemist**
Pittsburgh Testing Laboratory
- Engines, Gas, Oil or Steam**
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
- Exterior Side Panels**
Haskelite Mfg. Corp.
- Fare Boxes**
Cleveland Fare Box Co.
Economy Electric Devices Co.
Illinois Motive Equipment Co.
Johnson Fare Box Co.
Ohmer Fare Register Co.
Perey Mfg. Co., Inc.
- Fare Registers**
Electric Service Sup. Co.
Johnson Fare Box Co.
Ohmer Fare Register Co.
- Fences, Woven Wire and Fence Posts**
Acme Wire Co.
Amer. Steel & Wire Co.
- Fenders and Wheel Guards**
Brill Co., The J. G.
Cincinnati Car Co.
Root Spring Scraper Co.
Star Brass Works
- Fibre and Fibre Tubing**
Westinghouse E. & M. Co.
- Field Coils (See Coils)**
- Flashlights**
National Carbon Co.
- Floodlights**
Elec. Service Supplies Co.
General Electric Co.
- Floor, Sub.**
Haskelite Mfg. Corp.
- Flooring, Bus**
Tucio Products, Inc.
- Flooring, Car**
Tucio Products, Inc.
- Flooring, Fireproof**
Irving Iron Works
- Flooring, Non-Slipping**
Irving Iron Works
- Flooring, Open Steel**
Irving Iron Works
- Flooring, Steel Subway**
Irving Iron Works
- Flooring, Ventilating**
Irving Iron Works
- Floors**
Haskelite Mfg. Corp.
- Forgings**
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Columbia Machine Works
Standard Steel Works Co.
- Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
- Frogs, Track (See Track Work)**
- Frogs, Trolley**
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Funnell Castings**
Wm. Wharton, Jr. & Co., Inc.
- Fuses and Fuse Boxes**
Columbia Machine Wks.
Consolidated Car Heating Co.
General Electric Co.
Westinghouse E. & M. Co.
- Garage Equipment**
Columbia Machine Works & M. I. Co.
Westinghouse Tr. Br. Co.
- Gas Electric Drive for Buses & Trucks**
General Electric Co.
- Gas Producers**
Westinghouse E. & M. Co.
- Gasoline**
Standard Oil Co.
Texas Co., The
- Gasoline Torches**
Economy Electric Devices Co.
- Gates, Car**
Brill Co., The J. G.
Cincinnati Car Co.
- Gear Blanks**
Bethlehem Steel Co.
Carnegie Steel Co.
Brill Co., The J. G.
Standard Steel Works Co.
- Gear Cases**
Chillingworth Mfg. Co.
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
- Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Columbia Machine Wks.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
R. D. Nuttall Co.
Tool Steel Gear & Pinion Co.
- Generators**
General Electric Co.
North East Electric Co.
Westinghouse E. & M. Co.
- Girder Rails**
Bethlehem Steel Co.
Lorain Steel Co.
- Glass**
Protex Glass Co.
- Gongs (See Bells and Gongs)**
- Grating, Steel Subway**
Irving Iron Works
- Grease**
Texas Company
- Grinders and Grinding Supplies**
Metal & Thermit Corp.
Railway Trackwork Co.
- Grinders, Portable**
Ingersoll-Rand Co.
Railway Trackwork Co.
- Grinders, Portable Electric**
Railway Trackwork Co.
- Grinding Bricks and Wheels**
Railway Trackwork Co.
- Ground Wires**
Page Steel & Wire Co.
- Guard Rail Clamps**
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
- Guard Rails, Tee Rail and Manganese**
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
- Guards, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
- Hangers**
SKF Industries, Inc.
- Haps, Trolley**
Columbia Machine Works & M. I. Co.
Elec. Service Supplies Co.
General Electric Co.
National Bearing Metals Corp.
Ohio Brass Co.
R. D. Nuttall Co.
Star Brass Works
- Hammers, Pneumatic**
Ingersoll-Rand Co.
- Headlights**
Elec. Service Supplies Co.
General Electric Co.
Guide Motor Lamp Mfg. Co.
Ohio Brass Co.
- Headlining**
Columbia Machine Wks.
Haskelite Mfg. Corp.
- Heaters, Bus**
Nichols-Lintern Co.
- Heaters, Car (Electric)**
Consolidated Car Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Light-
Co.
Railway Utility Co.
Smith Heater Co., Peter
- Heaters, Car, Hot Air and Wafer**
Smith Heater Co., Peter
- Heaters, Car, Stove**
Smith Heater Co., Peter
- Helmets—Welding**
Railway Trackwork Co.
Una Welding & Bonding Co.
- Holists**
Sullivan Machinery Co.
- Holists, Portable**
Ingersoll-Rand Co.
- Hose, Bridges**
Ohio Brass Co.
- Hose, Pneumatic**
Westinghouse Traction Brake Co.
- Ignition Units**
North East Electric Co.
- Industrial Tractors**
International Harvester Co.
- Inspecting Engineers & Chemists**
Pittsburgh Testing Laboratory
- Instruments, Measuring, Testing and Recording**
American Steel & Wire Co.
Economy Electric Devices Co.
General Electric Co.
National Railway Appliance Co.
Roller-Smith Co.
Westinghouse E. & M. Co.
- Insulating Cloth, Paper and Tape**
General Electric Co.
Irving Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Okonite-Callender Cable Co.
Inc.
Westinghouse E. & M. Co.
- Insulating Silk**
Irving Varnish & Ins. Co.
- Insulating Varnishes**
Irving Varnish & Ins. Co.
- Insulation (See also Paints)**
Electric Railway Equipment Co.
Electric Service Sup. Co.
Irving Varnish & Ins. Co.
Mica Insulator Co.
- Okonite Co.**
Okonite-Callender Cable Co.
Inc.
Westinghouse E. & M. Co.
- Insulation Slot**
Irving Varnish & Ins. Co.
- Insulator Pins**
Elec. Service Supplies Co.
Ohio Brass Co.
- Insulators (See also Line Material)**
Electric Railway Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Irving Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Interior Side Linings**
Haskelite Mfg. Corp.
- Interrurban Cars (See Cars Passenger, Freight Express etc.)**
- Jacks (See also Cranes, Hoists and Lifts)**
Buda Co., The
Columbia Machine Wks.
Elec. Service Supplies Co.
- Joints, Rail (See Rail Joints)**
- Journal Boxes**
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
S. K. F. Industries, Inc.
- Lamps, Guards and Fixtures**
Elec. Service Sup. Co.
Westinghouse E. & M. Co.
- Lamps, Arc and Incandescent (See also Headlights)**
General Electric Co.
Westinghouse E. & M. Co.
- Lamps, Signal and Marker**
Elec. Service Supplies Co.
Nichols-Lintern Co.
- Lanterns, Classification**
Nichols-Lintern Co.
- Letter Boards**
Haskelite Mfg. Corp.
Nichols-Lintern Co.
Cincinnati Car Co.
- Lighting Fixtures, Interior**
Electric Service Supplies Co.
Guide Motor Lamp Mfg. Co.
- Lighting Systems**
North East Electric Co.
- Lightning Protection**
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Line Material (See also Brackets, Insulators, Wires, etc.)**
Electric Railway Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
National Bearing Metals Corp.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Line Shaft**
SKF Industries, Inc.
- Locking Spring Boxes**
Lorain Steel Co.
Wm. Wharton, Jr. & Co., Inc.
- Locomotives, Electric**
Cincinnati Car Co.
Cummings Car & Coach Co.
General Electric Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Locomotives, Oil Engine & Electric Drivers**
Ingersoll-Rand Co.
- Lubricating Engineers**
Standard Oil Co.
Universal Lubricating Co.
- Lubricants, Oil and Grease**
Standard Oil Co.
Texas Co., The
Universal Lubricating Co.
- Manganese Parts**
Bemis Car Truck Co.
- Machinery, Insulating**
Amer. Insulating Mach. Co.
- Manganese Steel Castings**
Lorain Steel Co.
Wm. Wharton, Jr. & Co., Inc.
- Manganese Steel Guard Rails**
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
- Manganese Steel, Special Track Works**
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
- Manganese Steel Switches, Frogs and Crossings**
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
- Meters (See Instrument)**
Roller-Smith Co.
- Mica**
Mica Insulator Co.
- Mirrors, Inside and Outside**
Cincinnati Car Co.
- Motor Buses (See Buses)**
- Motors, Generators & Controls for Gas Electric Buses**
General Electric Co.
- Motors, Electric**
General Electric Co.
Westinghouse E. & M. Co.
- Motorman's Seats**
Brill Co., The J. G.
Cincinnati Car Co.
Electric Service Sup. Co.
Hale-Kilburn Co.
Heywood Wakefield Co.
- Nuts and Bolts**
Bemis Car Truck Co.
Bethlehem Steel Co.
Cincinnati Car Co.
- Omnibuses (See Buses)**
- Ovens**
Young Bros.
- Oxy-Acetylene (See Cutting Apparatus)**
- Packing**
Westinghouse Traction Brake Co.
- Paint Spraying Units**
Binks Spray Equipment Co.
- Paints and Varnishes (Insulating)**
Electric Service Sup. Co.
Irving Varnish & Ins. Co.
- Paints & Varnishes, Railway**
National Ry. Appliance Co.
- Panels, Outside, Inside**
Haskelite Mfg. Corp.
- Paving Material**
American Brake Shoe & Fndry Co.
- Paving Materials, Vitrified Brick**
National Paving Brick Mfrs. Assn.
- Pavement Breakers**
Ingersoll-Rand Co.
Sullivan Machinery Co.
- Pickups, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.
- Pinion Pullers**
Drew Elec. & Mfg. Co.
Elec. Service Supplies Co.
- Pinions (See Gears)**
- Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.
- Pipe Fittings**
Standard Steel Works Co.
Westinghouse Tr. Brake Co.
- Planers (See Machine Tools)**
- Plates for Tee Rail Switches**
Ramapo Ajax Corp.
- Pliers, Rubber Insulated**
Electric Service Sup. Co.
- Plywood (Roofs, Headlining Floors, Interior Panels, Bulkheads, Truss Planks)**
Haskelite Mfg. Corp.
- Pneumatic Tools**
Ingersoll-Rand Co.
- Pole Line Hardware**
Bethlehem Steel Co.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
- Poles, Metal Street**
Electric Railway Equipment Co.
Truscon Steel Co.
- Poles, Ties, Posts, Piling and Lumber**
American Creosoting Co.
Bell Lumber Co.
International Creosoting & Construction Co.
J. F. Prettyman & Son
- Poles & Ties, Treated**
American Creosoting Co.
Bell Lumber Co.
International Creosoting & Construction Co.
- Poles, Trolley**
Bell Lumber Co.
Electric Service Sup. Co.
R. D. Nuttall Co.
Truscon Steel Co.
- Poles, Tubular Steel**
Electric Railway Equipment Co.
Electric Service Sup. Co.
Truscon Steel Co.

Kansas City Adopts Cinch Vertical Swipes on 561 Cars



*Window wiper in its lowest position.
It returns to the top automatically
by spring pressure.*



THE Cinch Vertical Swipe is a practical window wiper, scientifically designed and constructed to meet the requirements of Electric Railway use.

It is built for heavy duty. Operation is easy and instantaneous.

It cleans three and two-thirds square feet of glass. Rain and snow are carried downward, leaving a clear and non-glaring surface.

It is easily and quickly installed on any type of sash.

Cinch Manufacturing Corp., 2335 W. Van Buren St., Chicago, Ill.

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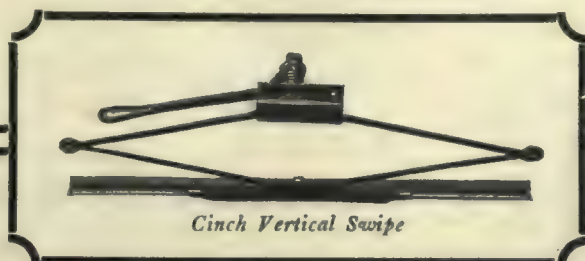
Illinois Motive Equipment Co.
35 E. Wacker Drive, Chicago

J. W. Gerke
303 Fifth Ave., New York

James A. Carson
407 Lloyd Bldg., Seattle, Wash.

Grayson Ry. Supply Co.
La Salle Bldg., St. Louis, Mo.

Railway Power and Engineering
Corp., Limited
133 Eastern Ave., Toronto, Canada



Cinch Vertical Swipe

Portable Grinders
Buda Co., The

Potholes
Okonite Co.
Okonite-Callender Cable Co. Inc.

Power Saving Devices
Economy Electric Devices Co.
National Railway Appliance Co.

Pressings, Special Steel
Cincinnati Car Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Traction Brake Co.

Pumps
A. S. Cameron Steam Pump Wks. (Ingersoll-Rand Co.)
Ingersoll-Rand Co. (A. S. Cameron Steam Pump Wks.)

Pumps, Air Lift
Sullivan Machinery Co.

Pumps, Vacuum
Ingersoll-Rand Co.
Sullivan Machinery Co.

Punches, Ticket
International Register Co.

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Illinois Steel Co.
Rail Joint Co., The

Rail Joints—Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rails, Relaying
Foster & Co., L. B.

Rails, Steel
Bethlehem Steel Co.
Foster & Co., L. B.
Illinois Steel Co.

Rail Filler
Carey Co., The, Philip

Rail Welding
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Railway Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co.
Electric Service Sup. Co.
Hale-Kilburn Co.

Rattan, Car Seat, Webbing
Heywood-Wakefield Co.

Registers and Fittings
Brill Co., The J. G.
Cincinnati Car Co.
Electric Service Sup. Co.
International Register Co.
Ohmer Fare Register Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Coils)
Westinghouse E. & M. Co.

Replacers, Car
Cincinnati Car Co.
Electric Service Sup. Co.

Resistances
Consolidated Car Heating Co.
General Electric Co.

Resistance, Wire and Tube
American Steel & Wire Co.
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.

Roller Bearings
Hyatt Roller Bearing Co.

Roof Covering
Chase & Co., L. C.

Roofing
Tucio Products, Inc.

Roofing, Car
Haskelite Mfg. Corp.

Roofs, Car & Bus
Haskelite Mfg. Corp.

Safety Control Devices
Safety Car Devices Co.

Sanders, Track
Brill Co., The J. G.
O. M. Edwards Co., Inc.
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car
Brill Co., The J. G.
Cincinnati Car Co.

Sash, Metal, Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Electric Service Sup. Co.

Seating Materials
Brill Co., The J. G.
Fitzjohn Mfg. Co.
Hale-Kilburn Co.
Haskelite Mfg. Corp.
Heywood-Wakefield Co.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Second Hand Equipment
Gerke, J. W.
Hyman Michaels Co.
Van Loan Corp., Irving S.

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

Short Circuit Finders
Ideal Commutator Dresser Co.

Shovels
Brill Co., The J. G.

Shovels, Power
Brill Co., The J. G.

Side Bearings (See Bearing Center and Side)

Signals, Car Starting
Consolidated Car Heating Co.
Electric Service Sup. Co.
National Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.

Signals, Warning
North East Electric Co.

Signal Systems, Block
Electric Service Sup. Co.
Nachod & U. S. Signal Co.

Signal Systems, Highway Crossing
Nachod & U. S. Signal Co.

Slack Adjusters (See Brake Adjusters)

Slag
Carnegie Steel Co.

Sleet Wheels and Cutters
Anderson Mfg. Co., A. & J. M.
Columbia Machine Wks.
Cincinnati Car Co.
Electric Ry. Improvement Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
National Bearing Metals Corp.
R. D. Nuttall Co.

Smokestacks, Car
Nichols-Lintern Co.

Snow Plows
National Railway Appliance Co.

Snow-Plows, Sweepers and Brooms
Brill Co., J. G.
Columbia Machine Wks.
Cummings Car & Coach Co.
Root Spring Scraper Co.

Snow Sweeper, Rattan
Brill Co., J. G.
Heywood-Wakefield Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Buda Co., The
Wm. Wharton, Jr. & Co., Inc.
Lorain Steel Co.

Speedometers
North East Electric Co.

Spikes
American Steel & Wire Co.
Illinois Steel Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs
National Railway Appliance Co.

Springs, Car and Truck
American Steel Foundries
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cleveland Steel Works Co.
Taylor Electric Truck Co.

Sprinklers, Track and Road
Brill Co., The J. G.
Cummings Car & Coach Co.

Stairsteps, Safety
Irving Iron Works

Starters
North East Electric Co.

Steel and Steel Products
American Steel & Wire Co.
Illinois Steel Co.

Steel, Electric Furnace
Timken Roller-Bearing Co.

Steel, Open-Hearth
Timken Roller-Bearing Co.

Steps
Irving Iron Works

Steps, Car
Brill Co., The J. G.
Cincinnati Car Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stones (Commutator)
Ideal Commutator Dresser Co.

Stop Signals
Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebblings Sons Co., J. A.

Street Cars (See Cars, Passenger, Freight, Express, etc.)

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands and Fixtures
Ramapo Ajax Corp.

Switches
General Electric Co.

Switches, Selector
Nichols-Lintern Co.

Switches and Switchboards
Consolidated Car Heating Co.
Electric Service Sup. Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Synchroscopes
Roller-Smith Co.

Tampers, Tie
Ingersoll-Rand Co.
Railway Trackwork Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Telephones and Parts
Electric Service Sup. Co.

Telephone & Telegraph Wire
American Steel & Wire Co.
J. A. Roebblings Sons Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers & Destroyers
Electric Service Sup. Co.

Tickets & Transfers
Globe Ticket Co., The

Ties, Mechanical
Dayton Mechanical Tie Co.

Tie Plates
Illinois Steel Co.

Ties and Tie Rods, Steel
International Steel Tie Co.

Ties, Wood Cross (See Poles, Posts, etc.)

Tires
Firestone Tire & Rubber Co.
Fisk Tire Co., Inc.
General Tire & Rubber Co.
Goodyear Tire & Rubber Co.
The Goodrich Rubber Co.

Tokens
Johnson Fare Box Co.
Scovill Manufacturing Co.

Tongue Switches
Wm. Wharton, Jr. & Co., Inc.

Tool Steel
Bethlehem Steel Co.
Carnegie Steel Co.

Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Columbia Machine Wks.
Electric Service Sup. Co.
Railway Trackwork Co.

Torches, Acetylene (See Cutting Apparatus)

Tower Wagons & Auto Trucks
McCardell Co., J. R.

Towers and Transmission Structures
Bates Exp. Steel Corp.
Westinghouse E. & M. Co.

Track Expansion Joints
Wm. Wharton, Jr. & Co., Inc.

Track Grinders
Metal & Thermit Corp.
Railway Trackwork Co.
Ramapo Ajax Corp.
Una Welding & Bonding Co.

Track, Special Work
Bethlehem Steel Co.
Columbia Machine Wks.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Trackless Trolley Cars
Brill Co., The J. G.

Transfer Issuing Machines
Ohmer Fare Register Co.

Transfers (See Tickets)

Transformers
General Electric Co.
Westinghouse E. & M. Co.

Transmission
SKF Industries, Inc.

Treads Safety Stair Car Step
Cincinnati Car Co.
Irving Iron Works

Tree, Wire
Okonite Co.
Okonite-Callender Cable Co.

Trimming Materials
Chase & Co., L. C.

Trolley Bases
National Bearing Metals Corp.
R. D. Nuttall Co.
Ohio Brass Co.

Trolley Bases, Retrieving
R. D. Nuttall Co.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
Westinghouse E. & M. Co.

Trolley Material (Overhead)
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
National Bearing Metals Corp.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Wheel Bushings
National Bearing Metals Corp.

Star Brass Works

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
American Brass Co.
American Steel Foundries
Amer. Steel & Wire Co.
Anacanda Copper Min. Co.
Bridgeport Brass Co.
Braz Steel & Wire Co.
Roebblings Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Commonwealth Steel Corp.
Cummings Car & Coach Co.
Taylor Electric Truck Co.

Trucks, Motor
International Harvester Co.
White Co., The

Truss Planks
Haskelite Mfg. Corp.

Tubing, Yellow and Black
Flexible Varnish
Irvington Varnish & Ins. Co.

Tubing, Steel
Timken Roller Bearing Co.

Turbine, Steam
General Electric Co.
Westinghouse E. & M. Co.

Turnstiles
Electric Service Sup. Co.
Percy Mfg. Co., Inc.

Turntables
Electric Service Supplies Co.

Upholstery
Chase & Co., L. C.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

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Irvington Varnish & Ins. Co.

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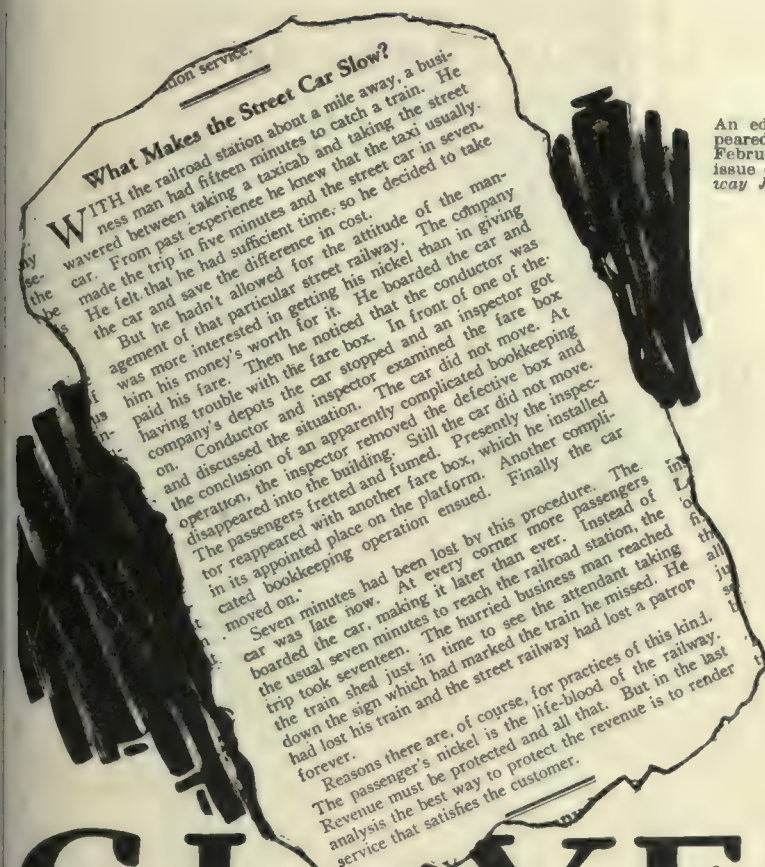
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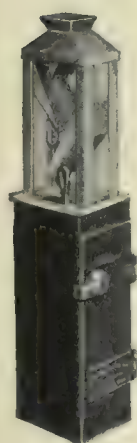


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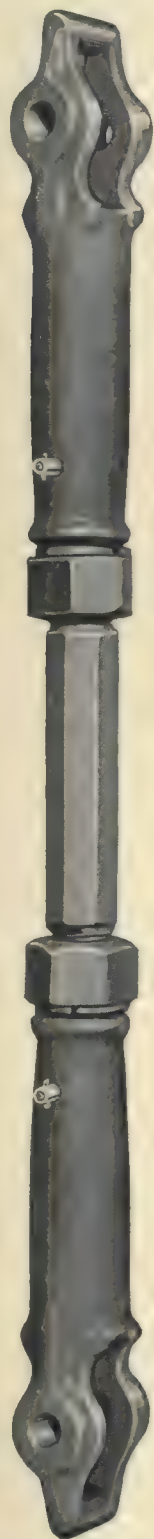
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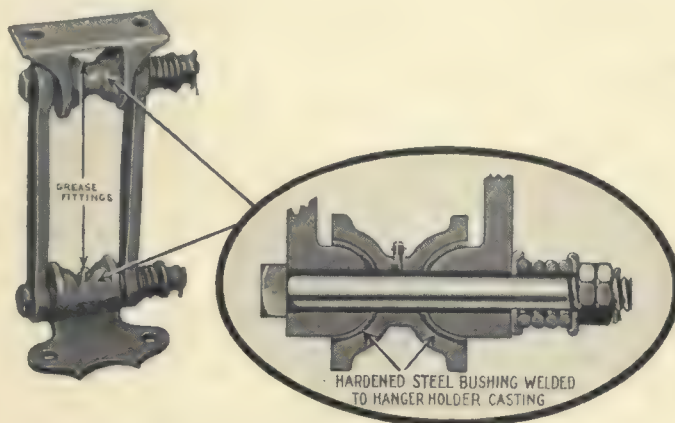
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Brill Half-ball Brake Hangers

The Advantages of Systematic Lubrication

THE Alemite System of lubrication will be applied to the brake adjusting rods and half-ball brake hangers on all Brill Trucks. The fittings are installed at the center of the half-ball brake hanger castings so the grease will flow to each hanger. On the brake adjusting rods, the fittings are installed over the threaded portion of the castings as illustrated.

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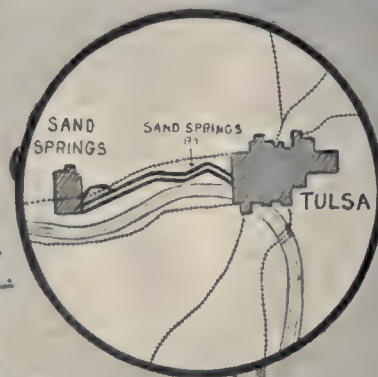


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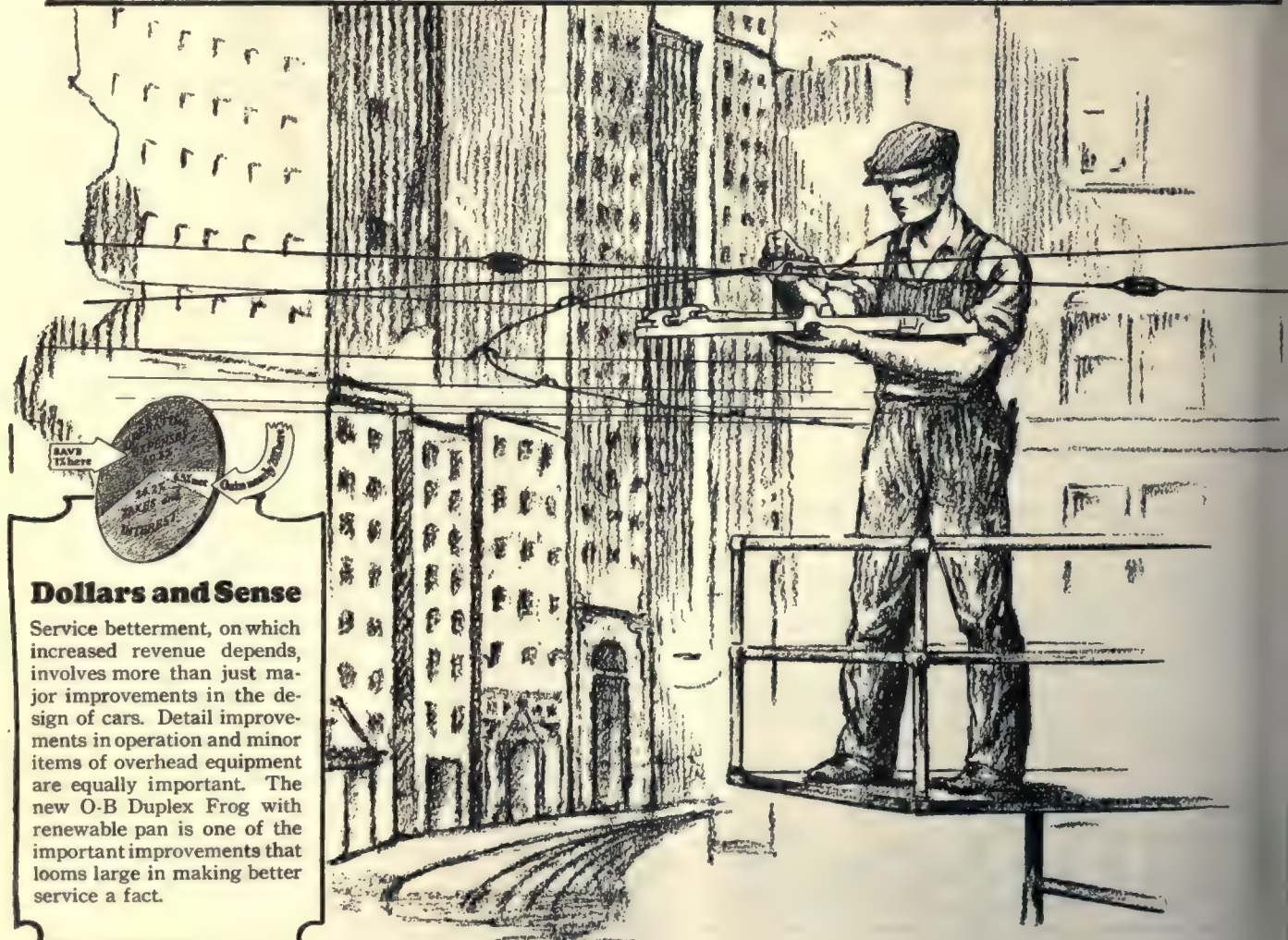
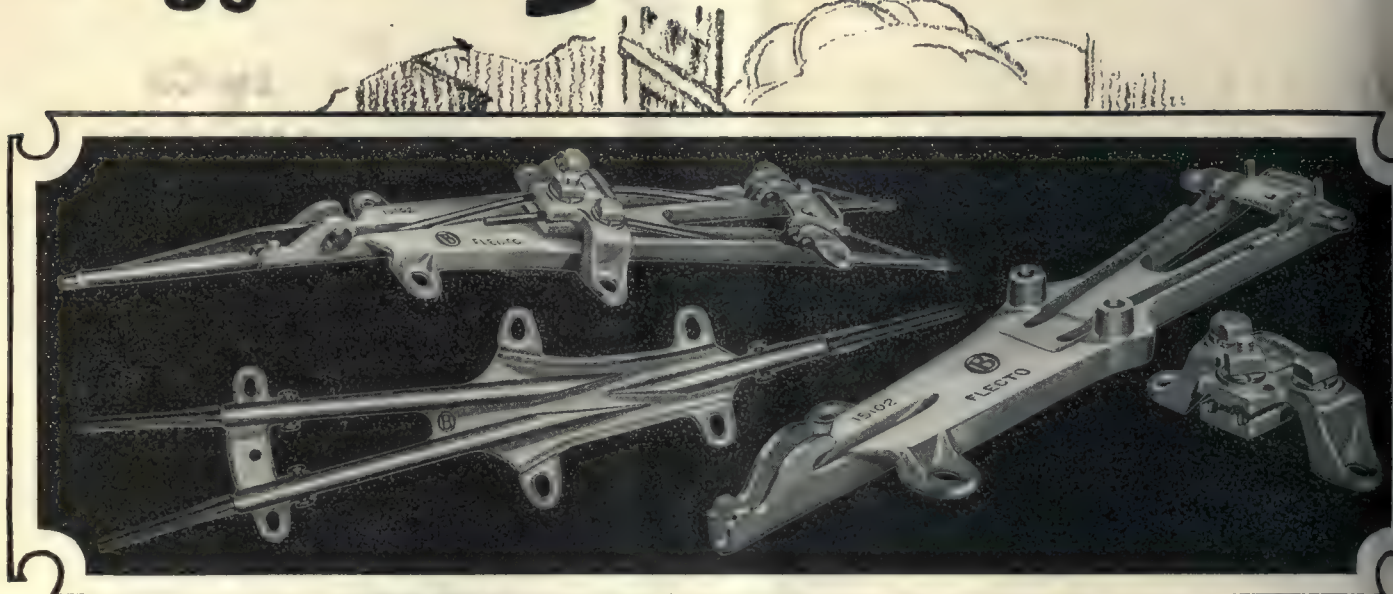
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The New



Dollars and Sense

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Quickly Renewed Without Disturbing
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IT'S ready now—the new O-B Duplex Trolley Frog—after two years' thorough service tests! A trolley frog of *modern* design, which combines all three advantages of longer life, easier renewals, and adaptability to any degree of turnout. Made with overlapping runners, of course, and with a *renewable* body or pan, which may be replaced without disturbing the supporting span or trolley wires, and without losing the exact location of the frog which is being replaced.

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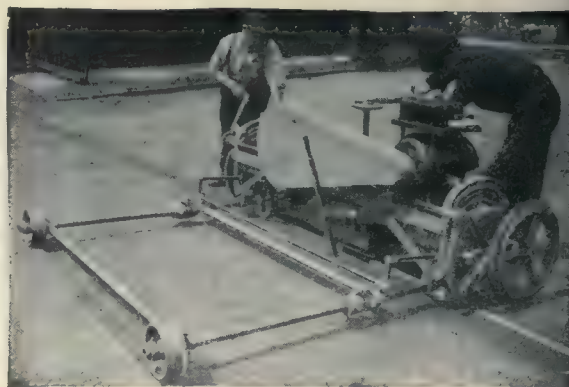
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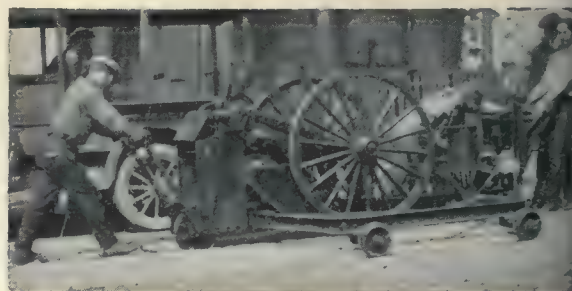
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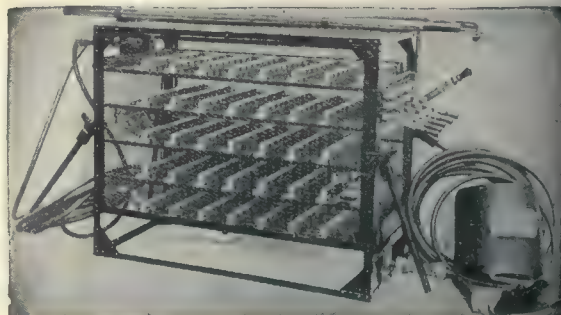
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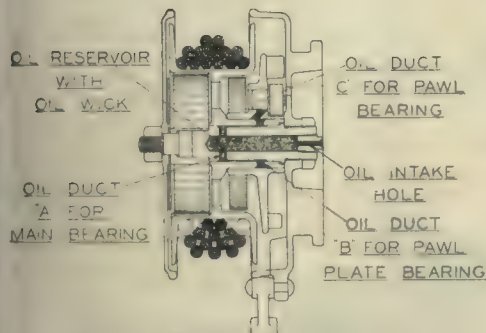


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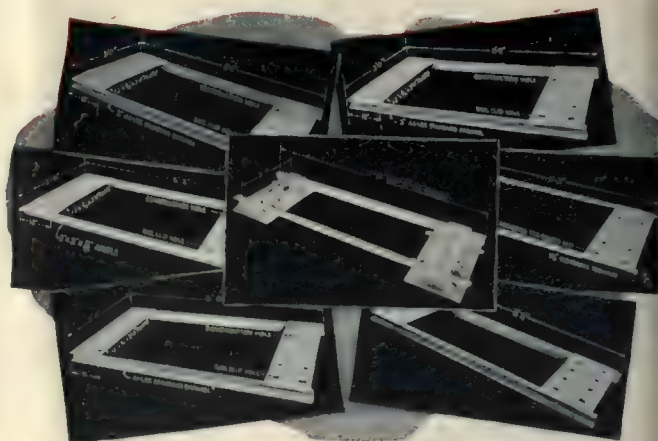
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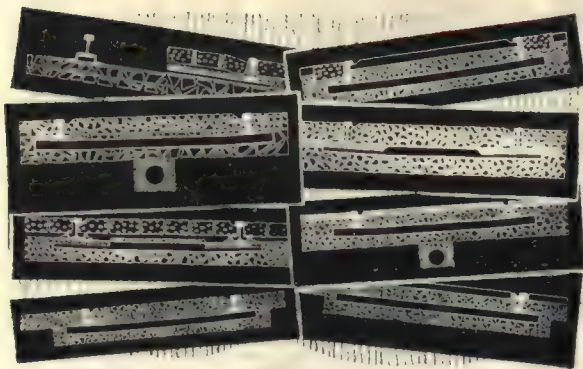
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Offers —*



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Seven types of Steel Ties.

—a complete line of seven types of Twin Ties, developed by seventeen years of practical Steel Tie Experience.



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—a collection of track design information from 70% of the leading electric railways.

**—more than a way
to build paved track,**

—a method of construction utilizing mass production principles and special labor saving machinery under the direct supervision of our field engineers.



The Compression Tamper.

STEEL TWIN

MODERNIZE THE TRACK AND THE METHODS

THAN A "STEEL TIE"

—and more than selling!

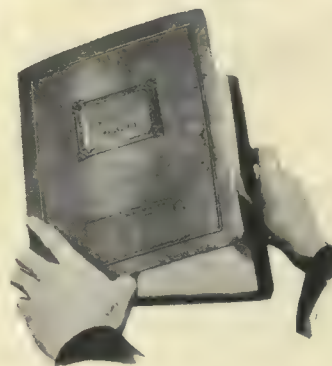
—a sincere desire to place the benefit of our 16 years of experience in specializing in paved track construction at your disposal.



—the pace must be kept!

THE pace of production has never been set, yesterday's pacemaker is a terrapin today unless he steps on the gas!

So with paved track construction. Yesterday's methods are as out of date and inefficient as the horsecar. Today Steel Twin Ties and mass production methods, utilizing special machinery, are setting the pace. And the pace set is not alone in speed, but in lower costs, more sound construction, and lasting—smooth track.



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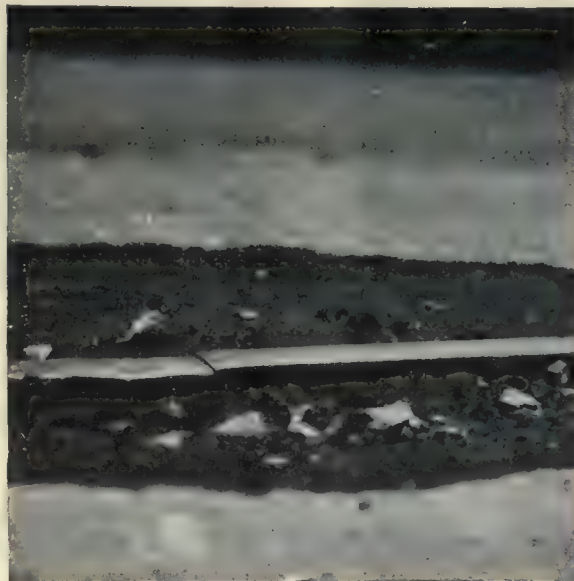
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CLEVELAND, OHIO

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THE BASE OF MODERNIZATION

Even if they fixed this joint for nothing—



It might still be too costly a proposition. It might still be thoroughly bad economics, faulty engineering, and poor street railroading.

For it's not the cost of repairing the joint, whether cheap or otherwise, that counts. It's the cost of tearing up the paving, opening a hole, and then replacing it all again. It's the delay to traffic. It's bad public policy.

A cheap repair, a poor job of welding, only means a repetition of the performance in a year or two. And the cost of doing it over again will be many times the slightly greater cost of a Thermit Weld.

Make it standard practice to Thermit Weld every joint that's opened for repair. The result will soon be a track that's free of bad joints for years to come.



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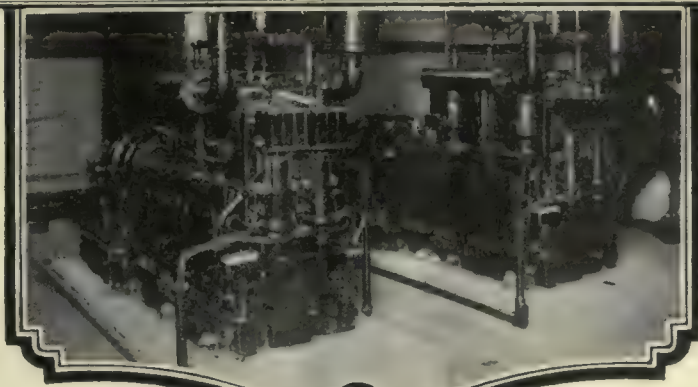
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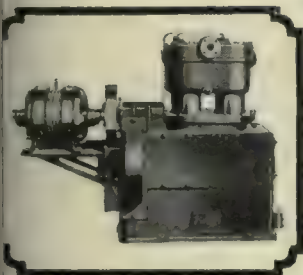


Many traction properties are using Westinghouse-National compressors exclusively in their shops and power houses.

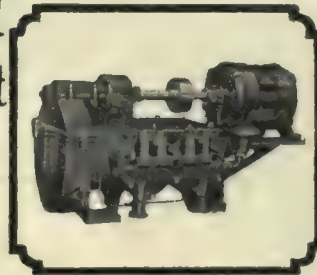
Typical power house installation showing two type "3VS" Westinghouse-National Air Compressors.



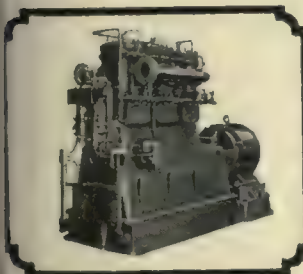
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Type "2V" compressor... 75 to 150 cu.ft. displacement is fully described in publication T-2047.



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Type "3VS" compressor... 208 to 488 cu.ft. displacement is fully described in publication T-2032.

BUILT in capacity sizes, ranging from 3 to 700 cu. ft. displacement, all Westinghouse National Air Compressors are designed and sturdily constructed to render a thoroughly dependable service. Infinite care and precision throughout their manufacture has given them unique recognition as the "Quality Machines For Quality Service."

Traditionally dependable, they run quietly, take up minimum valuable floor space, operate economically, and demonstrate conclusively, throughout years of faithful service, their superiority in maintaining maximum pressure for all shop and power house requirements.

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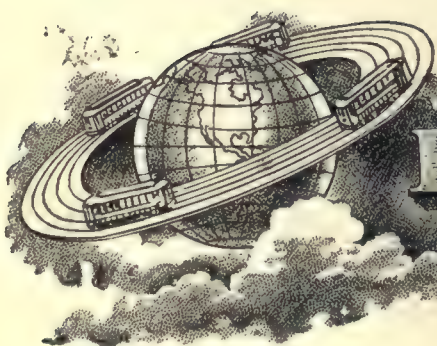
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JUST as the electric railway companies have to compile and be guided by exhaustive statistics as to peak loads, traffic densities, costs per mile, and so forth, we must constantly keep ourselves informed as to purchasing power, density of population and all vital market information in order to maintain our service as an active asset of your service.



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Circulating load and one man
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reduction of platform expense—
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The National Pneumatic Treadle
Door. Treadle operation is cir-
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public-be-pleased operation.

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The Practical Way to Say “Thank You, Ride Again”

Years ago a great chain store organization which has since quadrupled in size, inaugurated the snappy, cheerful “Thank you” and called it the most important part of every transaction. The public liked it.

In all seriousness—if a clerk can say “thank you” to the purchaser of a five cent cigar—why not say thank you to the buyer of a five or a ten cent ride? And more seriously still—if you make every block of every run noticeable for its comfort and convenience do you not remain consistently practical in your relation to your customers?

Do you know how important is the bearing of “Capacity with Comfort” upon increased revenue?

Cincinnati Car Company, Cincinnati, Ohio

CINCINNATI
BALANCED
LIGHTWEIGHT **CARS**

—still a step ahead of the modern trend

Glass Smooth

After

Six Years' Heavy Traffic

It's Dayton Tie Track

Six years of heavy urban traffic have left no impress whatever on this Dayton Tie Track.

It is as smooth and even as the day the first car ran over it.

Not a sign of a hump or a bump—you can't even tell where the joints are.

Six years is as nothing to Dayton Tie Track—conservative engineers estimate a life 3 to 4 times as long.

But other kinds of track often show decrepitude prior to six years' heavy traffic.





It is vital that motorcoaches carrying passengers to the planes of the Detroit-Cleveland Air Line keep on schedule. These motorcoaches are equipped with U. S. Royal Co-d Motorcoach Tires for dependable service.

PLENTY OF RUBBER IN U.S. ~~Motorcoach~~ ROYAL CORD Tires

— which means “Plenty of precisely the *right* kind of Rubber in precisely the *right* place in *every* tire.”

— which, further, means exceptional fortification against all the enemies of motorcoach tire mileage and the *lowest possible* cost *per* tire mile.



United States  Rubber Company
Trade Mark

UNITED STATES TIRES ARE GOOD TIRES

Transportation with gas-electric buses

Of all the buses purchased in the last three years by railway operators, over twenty-two per cent have been equipped with G-E electric drive. In January, 1928, alone, 332 bus equipments were sold to railway operators.

Although this drive has been available for only three years, railway companies are realizing, more and more, the advantages of G-E equipped gas-electric buses. The 1685 buses sold to 20 railway companies are evidence of their popularity in this field.



G-E railway specialists are thoroughly familiar with the requirements of bus operation. Consult them about the size of engine, the seating capacity, and other details for your service, just as you do when ordering car equipments.



390-36

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company, Inc.
CHARLES GORDON, Editor

Volume 71

New York, Saturday, March 24, 1928

Number 12

Getting Results from Employee Education

REALIZATION is growing that increased patronage for the transportation utilities is dependent in a measure on special training of employees. Street railway companies are finding themselves in an increasingly competitive business. It has been repeatedly observed in such business, other things being equal, that the greatest volume of patronage gravitates to the concern possessing the best trained employees. Consequently, the change in the transportation business from a monopoly to a competitive enterprise has emphasized the need for employees or "salesmen" so educated to an understanding of the business as to qualify them to create and maintain a cheerful contact with customers, both actual and prospective.

What, essentially, is a transportation "salesman"? Reduced to the simplest terms he would appear to be an employee who renders a class of service which pleases his customers. Training for this result consists of building up in each man's mind an understanding of the importance of three fundamentals: individual prestige, company prestige, and interest in his passengers or "customers." These are the ultimate objectives of electric railway educational work. The exact program to be followed requires a thorough understanding of the human factors involved and can only be developed from actual employee training experience. However, at the start, caution should be exercised against indulgence in too much academic instruction. The great mass of railway employees have not had much academic background; in fact it might be said that their particular aversion to it was some bearing on their present positions. Therefore, a pedagogical atmosphere or academic methods of transmitting an understanding of company policies may be expected to enlist little real interest from men who have an aversion to the class room. On the other hand, it is entirely possible to establish closer contact between operating officials and the men, and through such contacts to transmit a better understanding of the relation between the platform man and the passengers with whom he comes in contact.

This is not to say that the educational or employee training work of transportation companies should not be in the hands of specialists. It seems obvious that success in such work demands the entire attention of men who can devote their whole time to the development of a technique and procedure based upon close study and analysis of experience with employee training—both on their own and other properties. But such work should be conducted as an integral part of management; not as a side issue that can be turned over to an instructor and forgotten by the operating head. In fact, the education of transportation employees must be a part of the operation of the property and to enlist real interest the em-

ployee's contact with this work should impress him as an intimate contact with the management itself.

The language of employee education should be the language of operation—not that of the class room. The manager and department heads as well, must play their part in associating the educational work with the actual operation of the property. The work of equipping himself to handle the company's patrons as they should be handled is as much a part of the man's job as is the proper handling of equipment, fares or reports. Only by creating that point of view in the employee's mind can educational work accomplish the results sought.

Taking Time to be a Citizen

APPROXIMATELY two years ago a hard-pressed railway property changed ownership. When the new president arrived in town, a stranger, he found an unfriendly public and a fractious city government. The franchise situation was in a mess. Earnings were unsatisfactory; the company's service was condemned by public and press and the public co-operation necessary to bring about improvement was withheld.

After the short period that has elapsed since the change in management took place, this railway is giving the best service in its history. New franchises have been granted by the city and an *esprit de corps* has been built up among employees that is reflected hundreds of times a day in the contacts between platform men and car riders. The company's chief executive has been publicly thanked by the Chamber of Commerce for his service to the community. Public suspicion and antagonism have given way to confidence and friendliness.

How was this complete reversal in public relations brought about? For the answer, ask the man in the street. He reacts instantly to mention of the railway executive's name. Despite the arduous duties of running such a property, this man has found time to become one of the city's leading citizens. He belongs to five social clubs, the Rotary Club, and is a director of the Chamber of Commerce. In the latter body he serves as chairman of its river improvement committee and as a member of its advertising committee. He is a member of the city's port commission, forward movement committee, special gifts committee of the community fund, and the state higher education association. He is president of the safety council and a director of the retail merchants' association. He has toured the state with public bodies in the interest of good-will campaigns. In his own suburban community he is high in the councils of the citizens' association.

How has he found the time to give attention to all these community activities? He alone knows! But the results accomplished for his property speak for themselves. This man's activity is indeed in strange contrast

with that of the utility executive of a decade ago. It is the modern interpretation of the responsibilities of guiding the destiny of a public service enterprise. To be sure, it is a strenuous existence; but it is the price of winning and retaining public confidence. The utility executive of today must operate his property efficiently as a matter of course, but that alone does not suffice; he must take time as well to be a citizen.

Effect of the Open Winter on Railway Earnings

RAILWAY managers look on the very open winter which the East has been experiencing during the last three months quite differently from how they would have done fifteen years ago. Then such a season would have been welcome because of the reduction in cost of removal of ice and snow from the tracks.

The same saving has been made by the electric railways this year, but the absence of snow has also encouraged automobile owners to keep their cars in commission throughout the winter. On most electric railways the consequent loss in gross revenues has greatly exceeded all saving possible in operating expenses by the absence of snow. This helps to explain the lower gross earnings of some companies during the present "freak" winter. They are in somewhat the same condition as the dealers in furs and other winter clothing.

It is interesting to note various corollaries of this effect of the weather on railway earnings. One is that if the storms during the early part of the winter are sufficiently severe to induce the average automobile owner to put his car in dead storage, a great many such cars are apt to remain out of active use until spring really has come. A single storm or two, however, will not drive the automobilist to cover.

Another factor is the effect when the state issues part-time automobile licenses. In some states, a lower charge is made for a nine-months' automobile license, such as one taken out in April, than for a twelve-months' license, or one taken out in January. Where this practice prevails, the automobile owner whose car has remained in dead storage during January and perhaps part of February without a license will often wait until April 1 before taking out his new plates, in order to save a few dollars. In the meantime, the electric railway company gets his patronage for six weeks or two months longer than it otherwise would. But if the automobile owner should take out his license in January, he is apt to keep his car in condition to run the rest of the winter.

Liberalizing the New York Savings Bank Law

GOVERNOR SMITH of New York has before him for signature a bill legalizing the investments available to savings banks by including provisions for the purchase of certain public utility bonds and railroad equipment trust obligations. The passage of the measure represents an effort of years, culminating in recommendations made to the present session by a special joint legislative committee entrusted with the responsibility of making constructive suggestions for the revision of the archaic statutes.

Now that is just what these statutes were. They were archaic. They were well drawn, in fact better drawn

perhaps than those of any other state, except possibly Massachusetts, in the amount of protection they afforded for the funds of the small saver, but they took no account of the change of time—an element that has witnessed the great growth of electric light and power and railway industries. So far as the electric railways are concerned, their interest in the matter is only academic as the provisions of the measure, digested elsewhere in this issue, make plain, but the measure as passed does represent the advanced thinking of the day.

There is a plethora of money just now awaiting investment in substantial issues, but the changes in the law, if Governor Smith approves them, may be expected to work to the immediate advantage of the utilities, with the prospects that at some future date they may work decidedly to their advantage. The savings banks of New York are, of course, a mighty factor in their capacity to absorb investment issues of high character, but the problem of the past has been to find such investments in volume and still preserve the balance with respect to the various types of securities in which the funds were placed. The law as now amended should make the problems of the savings bank directors easier since it is estimated that \$1,402,536,000 par value of light and power bonds alone will now go on the legal list, and unless money becomes still easier the change should tend to make it possible to preserve the present liberal rate of interest, which in most cases, certainly in New York City, has been $4\frac{1}{2}$ per cent in recent years as compared with $3\frac{1}{2}$ and 4 per cent not so long ago.

The Spirit of Levity in Montreal

CARELESS are the ways of man in little things. If this were not so there would have been no solemn conclave in Montreal recently to decide upon the disposition of a fund of \$1,165,000 built up over a period of twelve years which represents money paid for lost or unused tramway tickets. Other companies have similar problems to deal with at times, but with them there is no occasion for comment at this time. With Montreal, however, the case is different.

When the franchise now in effect in Montreal was drawn in 1916, the fund which has grown to such proportion was negligible. If anybody thought about it then it did not make much impression. Weightier things were at hand. In consequence no clause was put into the operating agreement between the city and the Montreal Tramways providing for the disposal of sums so accrued. But the matter eventually became a poser. Even in this age of grandiose sums \$1,165,000 is not to be regarded lightly. True, under the disposition now agreed upon and still subject to sanction by the tramway commission only 20 per cent goes to the company as profit.

Since Montreal is under service at cost there are ramifications to the disposition of the fund startling and none the less interesting as a subject of speculation. Because human nature is so frail, the Council has wisely impounded \$500,000 of the fund against the possible presentation of lost or strayed tickets. It is just as well. Undoubtedly many of the tickets are not recoverable by their owners. For them they represent a dead loss. On the other hand, it is a fact that attention is being called to the more than \$1,000,000 of transportation paid for which never was used. This may result in the search of

the pockets of discarded or seldom-used suits of clothes and the unearthing of caches where tram tickets are likely to be hidden, perhaps along with unredeemed cigar coupons and other evidences of expenditure the only present tangible traces of which are printed slips whose values in the catalog are comparable with those quoted in the financial columns a few years ago for German marks.

To lay at the door of the people of Montreal the entire blame for the loss of \$100,000 in tickets each year would of course be fulsome. Montreal has many visitors, but since information is lacking in the printed account as to just how much of this sum accumulated in recent years, it is impossible to tell what proportion may be chargeable to wanderers on pleasure bent, who in an excess of spirits have overestimated their transportation needs. Anyway, the tickets stand against the railway as a liability. In the patois of the street the attitude of their holders appears to be "What the deuce do we care," but this very indifference created a problem solemn men were called upon to consider.

There Must be Something for the Stockholders

HEARINGS have been concluded at Washington, D.C., on the proposal to consolidate the Capital Traction Company, the railway lines of the Washington Railway & Electric Company and the Washington Rapid Transit Company, which operates the local bus line. The proposal is not unlike similar ones made during the last twenty years, but it has gone farther in that a unification agreement has been drawn up.

Officers of the companies are agreed that the consolidation is advisable in the interest of greater efficiency and economy of management and for the benefit and advantage of the public and the stockholders. If it can be arranged, the consolidation would undoubtedly be all that those who subscribe to it believe it would be. But while the people in Washington insist that some such plan shall be carried out, they wonder wherein they are to profit. This is a natural human reaction, but no one can tell in advance except in terms of intangibles. The co-ordination of the three services should work to their benefit, but whether it would be possible to reduce fares is another matter. One thing is certain. The railways will have to raise fares if the consolidation is not put through. If, after the economies are realized that can be attained under the consolidation, it is not possible to reduce fares, the public of Washington would still be the gainer even if in a negative way.

As indicated in the JOURNAL for March 17 the two railways are willing to accept a valuation of \$50,000,000 with a return of 7 per cent, although the value of the properties found in accordance with the rules of procedure laid down by the court is \$62,000,000.

After all, the people of Washington must be brought to understand that any agreement for voluntary consolidation, to be feasible, must be mutually profitable. True, it must be in the interest of the public. But if stockholders are expected voluntarily to agree to a merger the plan must be not entirely against their interests. And the prospect for public benefits are much better under the plan now proposed than it would be with the companies continuing to operate separately.

Presidential Year Pessimists

MOST anything is likely to happen in a presidential year. This is a political axiom. And several things are happening. Perhaps the most significant is the cry raised about unemployment. That unemployment has increased in recent months there can be no doubt, but the situation is not so serious as some would have us believe. On every occasion such as this the old panaceas are trotted out as if nothing had been heard about them before. If the political idealists of one stripe had their way the government—federal, state or city—would at all times stand ready to buy all surplus labor. Whether or not it should similarly be ready at all times to buy surplus farm products is for the successor to the populist to say.

To go back only 30 years, it was the late E. H. Harriman, if memory is not at fault, who propounded the idea that in prosperous times the railroads should as a matter of economy and as a civic duty pile up their earnings so as to apply them and their borrowings to the carrying out of work in slack times. This in a way is just what the utilities are doing that have come forward recently with programs for extensions and improvements to be carried out at once. Among them are the United Gas Improvement Company with its \$20,000,000 plan, the Cleveland Electric Illuminating Company with one of \$11,600,000, the Public Service Corporation of New Jersey, the Northwestern Electric Company and the Virginia Electric & Power Company, to mention just a few.

It is, of course, well for governments not to compete for labor in a crowded market. But the whole matter has been gone over before, with notable thoroughness during the 1921-1922 period. But no such situation as existed then confronts the country now. To quote just one source, information available to the National Industrial Conference Board indicates that employment conditions in the country as a whole have been improved since December, even though public attention was not focused on the unemployment situation until late in January and in February. The present status of business and industry appears to be well indicated by the fact that record automobile production was established during February by practically all automobile manufacturers with the exception of Ford, that there was record steel ingot production during February, that new building contracts in February were 18 per cent greater than in February of last year, that bank debits of individual accounts were about 1 per cent more than in February of last year and that general industrial activity based upon electrical energy consumed was about 7 per cent over February of last year. Business undoubtedly is being transacted on a lower level of profit than during the similar period a year ago, but it remains true that the volume is at about the same level as the comparable time last year, or not far below the record peak of all times.

Despite the many favorable factors, however, conditions have been considered sufficiently propitious for General James F. Coxey, of Coxey's Army fame, to reappear, for J. Eads Howe, "millionaire hobo," again to put in an appearance and for Mr. Zero to harbor a few migratory guests at his "Tub" in New York. The hitch-hikers know what they are doing. They have picked New York as the greatest show town in the world. And the trick has worked.

Building a Better Transportation Service for Kansas City

Comfort and convenience feature modernized service.
Fleet of 45 de luxe cars used to inaugurate new service
on a line a month. One-man operation rapidly extended

REHABILITATION of its street railway property was begun a year ago in a program launched by the Kansas City Public Service Company which has become of outstanding consequence, not alone on the score of a saving in operating costs to the property, but also because it has made possible a much improved street car service as expressed in frequency and car loading. This major rehabilitation program is regarded by the company as an investment in the city's future and as evidence of its confidence in Kansas City's continued growth and prosperity.

Involved in the work of rehabilitation has been a million dollar car rebuilding program, ultimate 100 per cent one-man operation of the modernized cars and an expenditure of another \$2,500,000 for track improvement. By the end of 1928, there will have been spent for rehabilitation a total of \$6,600,000. The decision to go to one-man operation of all of its cars was encouraged by the progress which has been made in the design of improved control and safety devices for this type of operation and likewise by the very favorable operating experiences which have obtained since the adoption of a limited number of one-man, double-truck cars in Kansas City in 1919. In the opinion of the management the gradual extension of the one-man operation since that time has made possible the financial results achieved during the period of receivership. The company operated in 1926 a total of 9,287,000 one-man car-miles, or 38 per cent of the total. Had these one-man car-miles been all two-man operated, it is estimated that the additional expense would have been in excess of \$500,000 per year.

Experience has demonstrated that there need be no material slowing up of schedules because of the one-man operation where sufficient additional service has been added to distribute the loads properly. Likewise, the accident record has proven better under one-man operation. This is attributed to improved mechanical features on the cars, and to the fact that the entire responsibility for the car operation is centered upon a single operator. As the outcome of the favorable results achieved there have been no protests from either the press or public authorities on the extension of one-man operation.

In inaugurating the new schedules, possible opposition on the part of the public to the one-man feature was avoided by the rehabilitation and improvement of equipment and by increased frequency of service with consequent relatively light loading per car. The public was given a service so superior to what had previously been

3 big links
in Kansas City's
TRANSPORTATION CHAIN

Home Comfort
on your way
Down Town!

FREE RIDES!
on the
Observation Park-31st St. Line
Sunday, November 20th
from 9 A. M. to 2 P. M.
(Transfers to Other Lines Will Be Made Upon Request)

A Car and Chauffeur of Your Own

No Original Investment
No Upkeep or Depreciation
No Salary to Pay

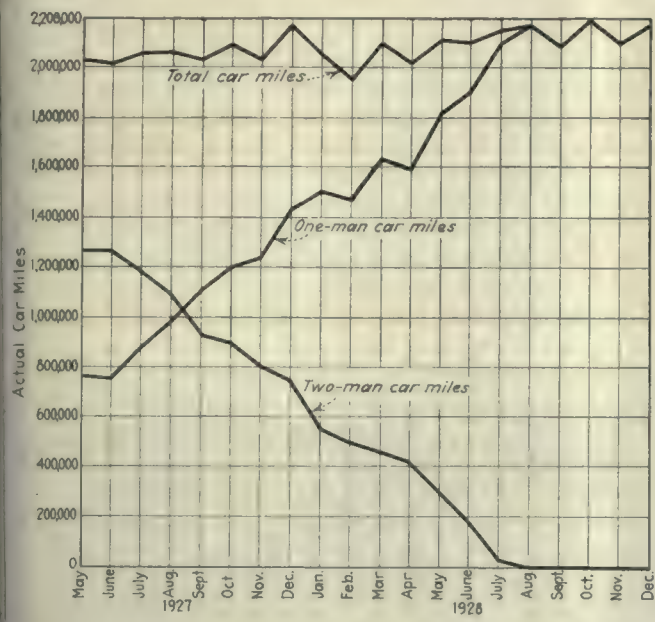
And Yet
You have at your own
house
A car costing more than
the most expensive limo
A carefully selected and
experienced chauffeur
And a service that for
promptness, safety, ease
and dependability
is unequalled by any
other transportation
agency

KANSAS CITY PUBLIC SERVICE COMPANY

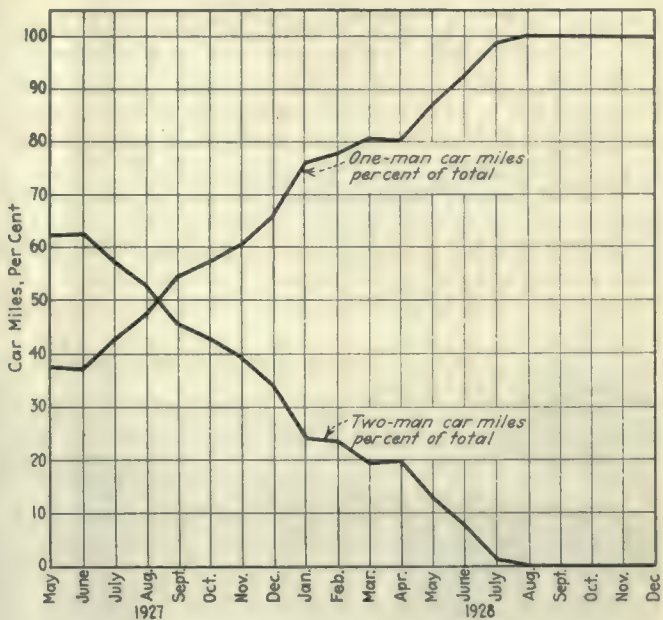
The improved service in Kansas City is being consistently advertised, using copy that calls attention to the rehabilitation of the railway property

possible that the advantages of one-man operation were quickly apparent. At the same time, an attractive differential in wage between one-man and two-man operation permitted trainmen to obtain a share in the economies effected. By stretching the period of installation of one-man cars over a sufficient length of time, the normal labor turn-over automatically compensates for the reduction in the number of men required to operate the cars. As each line is equipped with the rehabilitated equipment an increase of approximately 18 per cent is made in the non-rush hour service and 4 per cent in the rush-hour.

A newspaper advertising campaign is being run with advertisements appearing regularly four times a week in the *Kansas City Star* and the *Kansas City Journal-Post*. The copy, which is illustrated in accompanying cuts,



One-man car program in Kansas City showing actual car-miles operated one-man and two-man and progress of change



Progressive chart showing program for one-man operation in terms of percentage of car-miles operated

TABLE I—ONE-MAN OPERATION—CHANGE-OVER SCHEDULE 1927-28
SCHEDULE OF CAR SERVICE BEFORE AND AFTER NEW SERVICE INSTITUTED

Lines	Date New Service Instituted	A. M.		Mid-day		P. M.	
		Before	After	Before	After	Before	After
1. Country Club	July 3, 1927	32	39	15	17	37	43
2. Argentine-12th Street	Aug. 7, 1927	31	37	15	18	33	39
3. Brooklyn-Sunset Hill	Sept. 4, 1927	40	49	16	18	36	42
4. Sixth Street	Sept. 4, 1927	8	8	5	5	8	8
5. Independence Avenue-Rockhill	Oct. 16, 1927	32	37	15	18	33	40
6. 31st Street-Observation Park	Nov. 20, 1927	34	42	14	16	40	48
7. 15th Street	Dec. 4, 1927	18	22	8	9	17	22
8. Central-27th Street	Jan. 1, 1928	36	44	12	14	38	46
9. Northeast-Woodland	Feb. 19, 1928	31	38	13	16	36	43
10. Troost Avenue	April 1, 1928	43	43	15	15	42	42
1. Holmes-Quindaro	April 29, 1928	24	33	12	15	26	33
2. Jackson-Roanoke	May 13, 1928	28	35	13	16	34	39
3. Prospect	June 3, 1928	29	34	13	16	33	36
4. Chelsea-Indiana	July 1, 1928	31	35	14	17	32	36
5. Independence, Mo.	July 15, 1928	20	26	10	12	21	26

under the direction of an instructor or supervisor. As shown in the accompanying table, nine lines have been changed over to the new service to date, with six remaining to follow at intervals of about a month.

As the one-man service was introduced on each line it was found advisable for the first few days to augment considerably the number of regular street fare collectors on that line. During the initial period on a new one-man line, men are placed at every important loading point during the rush hour. Their duty is to direct passengers to the proper car entrances, assist them on and off the car, and in other ways explain the new operation. These extra men are used until riders appear thoroughly conversant with the new system.

To facilitate the introduction of the new service, traffic directors are also placed on duty inside the cars. They

pass out pamphlets which detail the improvements in the modernized cars. These men assist in no way with the actual operation of the cars and as the public becomes familiar with the service, they are withdrawn. Usually, four days to a week has been found sufficient to insure smooth operation of the one-man service on a new line.

To encourage patrons to give the new service a trial and to inspect the improved cars as they are introduced the Kansas City Public Service Company carries passengers free between certain hours on the first Sunday of the new oper-

addresses the mutuality of interests between the community and its transportation system, and calls attention to the greatly improved car service which is being given.

A definite schedule calls for the introduction of the modernized cars on about a line a month. In preparation for the extension of one-man operation it was necessary to give the trainmen special training. Men who had been regularly employed as conductors on the two-man cars were moved up to the front platform to work with their motormen as tutors, while men from the extra list replaced and performed the duties of the conductors. This was followed, in turn, by the transfer of the motorman to the rear platform to become acquainted with the conductor's duties. This latter training required only a very short period. Practical instruction of this type was followed by training school work and by operation of one-man cars



Composition rubber removable aisle strips and upholstered seats are used in the rehabilitated Kansas City cars

ation on each line. To inaugurate this service a group of 45 light-weight, double-truck cars, purchased in 1916 and 1917, were completely rebuilt in the company's shops for the specific purpose of introducing the modernized car service on each of the fifteen city lines in succession. In these cars it was the object to show what can be done to make a street car not only an efficient transportation vehicle, but distinctly attractive as well. The floor is covered with a special linoleum over a base consisting of builder's felt and canvas. In the aisle are removable composition rubber runners. The

to introduce the change-over to one-man operation and are then replaced with other rehabilitated cars after the new service is operating smoothly.

Attention is being given to making all rehabilitated equipment comfortable, attractive, and modern, by using new flooring, new ventilators, seat covers and attractive painting. In addition to making some reduction in operating expenses the improved schedules are expected to check the decrease in street car riding which has been steadily apparent since 1922.

Great emphasis has been laid on safety as the out-



Above—General appearance of rehabilitated Kansas City cars. Comfort, attractiveness and safety were the objectives sought in this work

At left—Pneumatically operated folding doors and a swinging exit gate were installed at the front end to guide boarding and alighting passengers

At right—An automatic treadle door is used on the rear exits of the cars to relieve congestion at the front end



vestibule floors are covered with a metal insert rubber flooring which even in bad weather when ice and snow is carried in, can easily be kept clean. These cars are equipped with skirts on the outside—lined with Celotex. The skirts give a stream-line effect to the cars, are considered to improve the general appearance, and, together with the floor inside, tend to minimize truck noises. A visor on the front of each car protects the operator's eyes from the sun glare, and increases the visibility in case of rain or snow by protecting the upper part of the window.

The 45 cars are completely equipped with safety devices, and in addition have upholstered seats and stream line painting. They are shifted from line to line

standing consideration in the operation of the new cars. A distinct effort is being made to gain the absolute confidence of the riding public. In the rehabilitation of the cars no features have been overlooked that in the opinion of the management can contribute to safe operation. The program covers the complete overhauling of motors, trucks, car bodies, controllers, heaters, wiring, piping, and all car appliances, and the addition of many new features such as safety air, folding doors, rear treadle doors, line breakers, back-up control, Economy meters, thermostats, new ventilators, air rectifiers, exit gates, weather stripping, etc.

All cars are being repainted and refinished inside and out, the new color scheme having been worked out by the

Kansas City Art Commission. The general scheme calls for orange and apricot on the outside, trimmed in plum with gray roof. The interior finish is a light drab-green above the arm rails, with a darker shade below. The ceiling is white.

All cars are being equipped for one-man, two-man operation, similar to the earlier 1,400 type on Troost Avenue, but with additional features such as treadle exit doors that make handling the loads much easier and give the public more conveniences.

Practically all cars are to be equipped with safety air equipment. Single sliding doors are being changed to double folding doors. The advantages claimed for the folding doors are that as both halves operate at the same time, quicker operation is obtained, and a greater total door width is available for both loading and unloading. National Pneumatic door equipment and treadle operated exit doors are being installed on all cars equipped with safety devices to permit passengers to alight at the rear of one-man operated cars.

The necessity of wyeing cars has been a source of accidents on single-end equipment. In backing cars under such conditions the operator's vision is limited. Consequently, a back-up device is being installed, by which the operator can control both power and air brakes from the rear vestibule of the car at will. Control of power is obtained by a dual line breaker control circuit with a push button on the rear platform. This circuit is operative only when the normal breaker control switch in the front vestibule is thrown to the rear control position. In normal operation the circuit is open and the push button in the rear vestibule is dead. Air brake control at the rear end is obtained by a straight air valve installed there.

All cars have been equipped with Economy meters during the year 1927. These are connected so that only the energy used by the motors is measured. The energy used for lighting, heating and air compressors is not measured. This arrangement was agreed upon in order that the transportation department could institute a competitive system of energy savings among the operators and eliminate the variables due to compressor, light and heat consumption. Spring Grub weather strips are being installed on window sash to eliminate rattling and to make them easier to open and close in damp weather.

ACCIDENT RECORD IMPROVED

A comparison of accident figures for the past two years on seven divisions of the company's property is afforded in the accompanying table. It is to be noted that the total accidents now charged to the motorman-operator includes types formerly charged to the conductor. Should the present record continue, it is anticipated that one-man operation will show a decided decrease in accidents.

TABLE II—COMPARISON OF ACCIDENT RECORDS
1926 AND 1927

Year	No. operators having no accidents	No. operators having accidents for which not held responsible	Car collisions	Vehicle accidents
1926	65	210	123	5,011
1927	50	220	104	4,997

Labor turnover for 1927 was comparatively normal; in fact there was a 5 per cent decrease in comparison with the preceding year. Yet, in the face of an unexpected declining turnover in labor, it was found possible

to introduce one-man operation on one line a month of the fifteen lines on the property and at the same time to hold down to a small number, the active men transferred to the extra lists.

TABLE III—COMPARISON OF LABOR TURN-OVER
1926 AND 1927

Year	Per Cent turnover	No. men hired in Transportation Division	No. men who left service
1926.....	22	309	327
1927.....	17	59	271

Since May 10, 1927 no platform men have been hired.

Summarizing briefly the physical accomplishments to date in the establishment of the modernized street car service in Kansas City, 332 street cars have already been rebuilt up to the first of the year in the shops of the company on a production basis which is continuing to turn out two reconstructed cars a day; nine lines have already been turned over to modernized car operation, the last one of this group having been transferred Feb. 19; and 575 men in the period from June 1, 1927, to Jan. 1, 1928, have completed instruction in one-man operation.

Holds Up Electrification

Committee appointed by the Austrian government to study the financial and technical problems involved

WHEN the present electrifications of the Austrian steam railways are completed no further work will be done for at least some time. This was announced during the latter part of last year by the Austrian government, whose railway system is owned by the state but is independently managed. The railway authorities said that they wanted to see whether the financial results on the existing system warranted further electrification. Among the routes affected by this decision is the trunk line from Vienna to Salzburg which carries the densest traffic of all Austrian lines.

The most serious handicaps to Austrian electrification are the low fares required by the country's economic condition and the high rate of interest which has to be paid on loans required to finance the change. The railway authorities estimated that owing largely to these two factors, the electric operations of the Vienna-Salzburg line would show an annual deficit of approximately \$1,200,000. Other arguments against a change are recent improvements in steam locomotive design, resulting in less fuel consumption, and the lower prices for coal in effect at the present time.

According to the European technical press, this decision has met with considerable criticism from various sources. The manufacturers of electrical machinery, expecting more orders for equipment, have considerably enlarged their production facilities and quite naturally are opposed to any decision to stop the electrification. The official figures of estimated loss have been attacked and Professor Seefehlner, a well-known expert in railroad electrification, has published an estimate that instead of a loss there would be an annual profit of \$952,000 from the Vienna-Salzburg line for electric over steam operation. The four big electrical manufacturing concerns have offered in a joint bid to take over the whole

work at a fixed price so that it would not have to be done by the railroad's own forces.

The latest development in this matter is that the Austrian Parliament has authorized the government to appoint a committee of experts to conduct an extended investigation into all the questions involved.

The Vienna-Salzburg line is a very important link in the railway system of Central Europe and connects the western countries like France and Switzerland with the Balkans and points farther east. To meet the needs of complete electric operation, from 138 to 152 locomotives for through service and from 20 to 22 motor cars for local service will be required. The plans call for five substations, each with a capacity of from 3,000 to 7,500 kva. to supply about 94,000,000 kw.-hr. annually. The electrification of this line would save the necessity for the import annually of some 300,000 tons of coal required under steam traction, since ample energy can be developed from available water power.

Light-Weight Double-Deck Car for Scottish Tramway

BY G. F. MOLLER
Bothwell, Scotland

ENGINEERS of tramways in England for some time have been endeavoring to produce a light-weight car to meet omnibus competition. The double-deck car is still in almost universal use in Great Britain, so it is not surprising to find that with the exception of the Bradford high-speed, worm-driven car developments in British cars have been with the double-deck type.

To meet present-day traffic requirements the Lanarkshire tramway system, which is a suburban line linking several large towns to the east of Glasgow has remodeled some of its existing cars to produce a new design of top-covered vehicle. The remodeled equipment was provided with extended platforms, vestibuled ends and front exits. The top-covered cars weighed but 339½ lb. per passenger seat, which is considered as the lightest for the type of any cars used in Britain.



Type of car before remodeling with open upper deck.

The underframe structure is of oak, the side sills having 6-in. x 4-in. sections, reinforced with a 5-in. x 3-in. x 1/8-in. rolled steel angle. The body framing is entirely of teak with the exception of cant rails and fence rails. In the lower saloon the pillars are secured to the underframe by special malleable iron brackets. Adjustable truss-rod brackets are used. Deep section longitudinal rails are employed, the waist rail being 5 in. deep, while the light rail is arched over the side windows and has a shoulder 7 in. deep on the pillars.

Car bodies constructed according to this design have given excellent results in service despite the poor condition of the track in several of the routes over which they are operated. Roller bearings are employed for both journal and armature bearings. The electrical equipment consists of two 35-hp. British Thomson-Houston light-weight interpole motors with B-510 controllers. The car completely equipped but without passenger load weighs slightly more than 10 tons and has a center of gravity 4 ft. 2 in. above the rail level.



Double-deck car with inclosed upper deck. End-inclosed vestibules are provided

Terminable Permits Are Proving Their Worth

The plan is much to be preferred to the old-time franchise. This is the opinion of the author, expressed to the members of the Illinois utilities associations at their joint meeting at Springfield, March 14-15

By E. R. Dillavou

Assistant Professor of Business Law and Economics,
University of Illinois, Urbana-Champaign, Ill.

SIMPLY defined, a local franchise is a permit to use the public streets for the purpose of rendering some public service thereon. There are those who still cling to the idea that it constitutes a gift of untold value. But subjected to effective regulation combined with a true appreciation of the purpose of a public utility on the part of the operators, utility service no longer opens an unusual opportunity for profit at public expense.

The local franchise has had a somewhat varied history. At first the tendency was to issue perpetual grants. This was followed by another period in which it became customary for the legislatures to limit the period for which a franchise might be issued. Provisions were inserted leaving for their purpose the control of rates and service during the franchise period. Because of the rapid development of the arts and various changing conditions, it soon became impossible to prophesy the future with any degree of accuracy. To meet this difficulty the tendency was to shorten materially the franchise period. This failed to remedy completely the defects in such a scheme of regulation, and from about 1907 to 1913 statutes were enacted in various states creating public service commissions, whose duty was to regulate the public utilities in accordance with the general provisions of the act. Thus, if the short-term franchise was ever a necessity as an aid to regulation it is a certainty that its usefulness expired at that date.

The short-term franchise imposed an exceedingly grave handicap upon utility financing. Investors were unwilling to place huge sums of money in an enterprise unless some provision was made for their repayment at or before the expiration of the franchise. As a result money needed for extensions and improvements often was not obtainable; the ultimate effect was reflected on service. As the franchise neared its end no investor was willing to tie up large sums of money in permanent improvements, when no assurance was given of continued life beyond the franchise period.

Furthermore, the temptation was ever present on the part of the public utility to disregard service, in order that a reserve might be accumulated to amortize the loss in the event a new franchise failed to materialize. To this extent the rate paid was higher than it should have been for the service received. In addition, numerous political upheavals and disturbances were certain to break out during new franchise years. Some of the states

amended their laws, so as to place no limit on the franchise period, others adopted terminable permits, while the balance still retain limitations for at least some, if not all, of the utilities.

PRINCIPLE OF TERMINABLE PERMIT NOT NEW

There is nothing novel or complicated about a terminable permit. It is a franchise which continues indefinitely, unless the utility is purchased by the municipality, or unless the permit is canceled because of misconduct on the part of the company. Such a permit seems to remedy the evils of the short term franchise and, at the same time to protect the public interest, particularly since a public utility is subject to regulation by a state commission. The investor, having faith in the behavior of the management, and realizing that his money will be repaid if the city sees fit to terminate the permit, is ready to supply money from time to time as the progress of the business demands it.

Why is it that the use of the terminable permit has not become more universal? It is customary to state that there are nine terminable permit states, while as a matter of fact in only six of these can it really be said to exist, and in some of the six only certain classes of utilities are entitled to its benefits. The answer lies in a consideration of at least two important problems. Whenever the various interested parties are able to agree on the type of terminable permit law to be enacted and the kind of regulation best adapted to its use, the way will be open for their general adoption.

One of the most important problems confronting any municipal body at the time a franchise becomes necessary is: What duties shall be imposed upon the utility, or what terms shall be inserted in the permit? As the utility takes on a life of indefinite duration, the question becomes doubly important. No utility desires to burden itself, or its customers, with heavy obligations for an indefinite period. On the other hand, municipalities seem most unwilling to surrender this last vestige of control over the local utilities. As a result, wherever term franchises still exist we find various onerous conditions imposed upon the utility in favor of the municipality.

Four possible solutions of this problem have been suggested by the laws of terminable permit states. The laws of Louisiana, which limits the use of such permits to the city of New Orleans, allow the municipality to

insert any conditions which may be agreed upon at the time the permit is issued. Oklahoma provides that all new franchises must be for a definite term, but they may be surrendered, at the option of the utility, for terminable permits which embody the terms of the surrendered franchise. The Massachusetts law makes it possible for many of the utilities to have all duties commuted into an annual money payment. Wisconsin is illustrative of a group, the law of which reads that the permit shall be held "under all the terms and limitations of this act." The courts have construed this to mean that each permit is to be like every other permit, the consequence being that all burdensome provisions are eliminated and no new ones may be added.

A clear appreciation by the public of the effect of such burdens might help to solve the problem. Under our theory of regulation, it is clear that the cost of these burdens enter into the rate and become an indirect tax levied upon the consumer. This tax is one which benefits all taxpayers alike at the expense of utility users. A universal recognition of this fact would soon spell the end of such provisions.

WHO IS TO REGULATE?

Perhaps the greatest stumbling block in the path of universal use of the terminable permit is the dispute which continues to rage over which arm of the government is to regulate—state commission or municipality. In Louisiana municipalities are in complete charge, while the other extreme is typified by Massachusetts which has strict regulation by a state commission. The other states fall somewhere between these two extremes. In this connection Indiana and Wisconsin have hit upon a division of authority between the two bodies. In Illinois at present, the practice is the same as that in Massachusetts. All phases of the regulation problem are handled by the state commission. A brief consideration of the Wisconsin scheme of division of authority appears desirable. The following suggestions are in support of this plan.

Uniform accounting procedure, which has been established by the state commission has proven of immense value to both the public and the utilities. It has made possible intelligent and valuable comparisons, and, thus, has proved a great aid in ascertaining the relative efficiency of different companies operating under similar conditions. It has helped to clarify for utility operators some of the problems existing before a well defined procedure was adopted. Clearly the control of accounting procedure must rest in the hands of some central authority.

The same may be said for control of security issues. Security issues are sold throughout the state and often a particular issue is secured by property to be found in many distant communities. Any proposition calling for control of them by the municipalities is absurd. The credit of utility companies can only be maintained when security issues are approved by some central authority entrusted with their strict supervision.

State commissions have been criticized most severely by proponents of local control because of their attitude on rates. These proponents maintain that the foremost purpose of any regulatory system is to see that good service is rendered at the lowest possible rate which is consonant with justice to all parties concerned. They contend that this objective has not been attained by state commissions. The rates are too high, they urge, because of exorbitant valuations and excessive operating expenses. The implication is left that local control will

remedy the defects, although more often than not, definite procedure for doing so is lacking.

Occasionally the criticism has been well taken, but I believe in most instances it has been misdirected. Take, for example, the matter of valuation. Undoubtedly, many state commissions personally favor a different method of arriving at a rate base than that adopted by the Supreme Court of the United States. Yet, in the face of the decisions of the federal courts they are helpless. Occasionally the utility operators have, I believe, been guilty of making unreasonable and economically unsound demands. Particularly has this been true with certain of the intangible items. There also are those who criticize severely the use of reproduction cost as a basis for rate making. But even assuming that the majority of valuations are too high, which is still open to proof, it is not at all clear how local control proposes to relieve the situation. The companies will be subject to the jurisdiction of the same courts. The same fundamental principles for determining a return must be used by the city that the state commission has been compelled to adopt.

The second objection to rates granted by a state commission is said to arise from excessive operating expenses. It is said that this results from the lack of any special incentive or inducement offered for efficient management. That too often a utility is given a definite rate of return, without considering adequately its operating efficiency is unquestioned. Any saving resulting from increased efficiency between the rate hearings belongs to management. Therefore, particularly among the large companies, emphasis is constantly being placed on low cost of production and an extension of the utility into new fields of endeavor, in order that added return may be obtained. Furthermore, many of these companies, evincing a realization of their public calling, are voluntarily dividing these profits with the consumers through reduction of rates. It is in such cases that management truly realizes the function which the government permits it to perform. Because some managements do not entertain a high regard for this public trust there is some strength to the criticism. Much could be done by state commissions in working out definite plans to encourage decreased operating expenses by offering a reward for reduced rates. Although municipalities are prone to criticize existing conditions, no definite improvement has been suggested by them.

Two additional reasons are suggested why state regulation of rates is desirable. First, many of the municipalities are financially unable to engage the trained technical help required to solve the rate problem in an intelligent manner; second, the municipality is an interested party in at least two respects. It is itself a user of utility service; and, in addition, the municipal officials represent directly the consumers and form a part of that body. Sound reasoning certainly demands the establishment of rates by some unbiased third party. The state commission seems to fill most acceptably this need.

SERVICE REGULATIONS DIFFER

It is in the matter of service that we may be inclined to disagree and where Indiana, Minnesota and Wisconsin have departed from Illinois. The State of Illinois has gone to extremes in holding that all matters which in any possible way affect service fall within the purview of the Commerce Commission. The Supreme Court in the Atwood and Northern Trust Company cases held that the municipality had been robbed of its power to regulate

at grade crossings and to control such matters as headlights, speed of cars, and the like within the city.

It seems quite evident that matters of police regulation, which affect primarily the physical comfort and safety of its citizens, should rest absolutely with the municipality, even though such ordinances relate to public utilities. Unless some general order of the commission is contravened, the ordinance should be respected.

It is, however, in the matter of the more general control of service that these states depart so radically from others and to which more detailed consideration must be given. There are two distinct phases of service. One relates to the establishment of standards, while the other concerns itself with extension of service. In the matter of standards, these states have granted to the municipality original control, with the possibility of an appeal to the state commission if the utility deems the orders unreasonable. The municipality rules supreme where the problems of extension are involved. Only intervention by some court can interfere with municipal orders issued therefore.

TWO REASONS FOR LOCAL SERVICE CONTROL

There are two rather pungent reasons favoring local control of service; first, the consumer, taken as a group, is entitled to the service his taste calls for, if he is willing to pay the price; second, the extension of service is essentially a local problem and is inextricably interwoven with municipal development. In support of the first contention, I feel that municipal officials are more attuned to the needs and desires of their constituents than is true of an outside body. A busy state commission should not be forced to familiarize itself with an already well-known local demand. Limited only by a willingness on the part of consumers to pay an adequate rate for the service requested, municipal control of service standards appears desirable. Certain difficulties may arise where one operating company serves numerous communities. In an absence of an agreement among them, where different standards are not available because of the uniform nature of the service, some provision for an appeal must be made.

Regarding the second point, it is common knowledge that the orderly development of any city is dependent on the extension of various classes of utility service. A city planning commission cannot function, zoning ordinances cannot be enforced, and paving of city streets must be delayed unless the utilities co-operate. Definite programs relating to municipal development can only be formulated with any degree of assurance of execution when public utility service can be relied upon. By placing the control over extensions in the hands of the body which is directly responsible for the progress of the community, the difficulty is solved. Development of any section of the city is certain to be accompanied by the needed utility service.

In addition, I believe that by placing control over service in the hands of municipal officials, there will involve a more pleasant and wholesome co-operation. Many problems must of necessity be worked out in harmony with city officials. By delegating to them regulation over service, I feel that a friendlier spirit of co-operation would be certain to prevail. Certainly the replies received from both cities and utilities indicated that municipal and utility relations had greatly improved with the advent of the terminable permit into Indiana and Wisconsin.

There are other matters of importance, such as the

surrender of existing franchises, who is to issue the permit, provisions for termination and others, which deserve consideration. In conclusion, merely allow me to make one additional observation. The advantages of a terminable permit apply with equal force to all utilities. At present the street railway industry in Illinois is particularly handicapped by twenty-year franchises. Nevertheless, other utilities are in many instances compelled periodically to bargain for continued existence. A terminable permit law should apply alike to all utilities. The benefits are certain. Neither the investors nor the consumers should be deprived of the advantages which are to be derived from the use of terminable permits.

\$200,000 to Improve Philadelphia Cab Maintenance Facilities

IN LINE with its policy to supply the cleanest and safest cab equipment possible, the Yellow Cab Company, affiliated with the Philadelphia Rapid Transit Company, is constructing what is believed to be the largest cab maintenance shop in the world, at 812 Schuylkill Avenue. This shop will have a capacity for handling the entire mechanical maintenance of a fleet of 1,500 cabs.

The Schuylkill-Catharine, or K-T garage, as it is called, is located at Schuylkill Avenue and Catharine Street. A P.R.T. way department shop formerly occupied the adjacent premises at 812 Schuylkill Avenue, and this building is being thoroughly remodeled to meet the needs of the cab maintenance organization. It is planned to have the mechanical equipment ready in 1928.

All cabs on the system will be cleaned, inspected and repaired at this new shop. At regular two-week intervals each cab will be sent to 812 Schuylkill Avenue for a 24-hour stay. The salesman who is driving the cab on the particular day of its appointment with the laundry and dispensary will drive his cab to the Schuylkill shop rather than to its home garage at the end of the day. The cab will first be thoroughly cleaned and washed. It will then be carefully inspected to insure first-class mechanical condition. Any repairs and adjustments will be made at once. A force of shop drivers will return the cabs each night to their home garages. "Trouble shooters" in each garage will, however, make minor repairs necessary between the times of regular inspection.

The cab washing and repair apparatus will be the last word in cab maintenance equipment. A lacquering machine will be installed to add the finishing touch of polish and shine. With the completion of this work and the centralizing of the garage mechanical departments it is expected that the number of street disablements will be materially reduced, and that the cost of keeping the cabs in good operating condition will be considerably lowered.

The operating offices of Yellow Cab, now located at 1734 North Broad Street, will be moved to the second floor of the new shop the latter part of November or the early part of December. In addition, the stores department for all garages will be located at 812 Schuylkill Avenue. The instruction department for new salesmen, their classrooms and the uniform room will also occupy a section of the second floor. In fact, the whole Yellow Cab organization, with the exception of the executive offices, the traffic department and the four garages, which then will do little more than house the cabs, will be combined in the new quarters.

This new project will cost approximately \$200,000.



One of the stretches of track that was rehabilitated. In this view the temporary track is being laid alongside preparatory to tearing out the old track so that the service will not be interrupted



This view was taken 37 days after the previous one, with the new track completed and in service. The sign at the left of the street indicates one of the publicity methods adopted by the company



Curing the concrete on one of the stretches of new track constructed by the Altoona & Logan Valley Electric Railway in its 1927 program



On some of the suburban lines the company has placed the track in paving in preparation for a later paving program of the city which may be carried out this year



On account of the marshy soil in Altoona tile drains were laid under all of the tracks. This view shows a standard type of drain under the center of the track



Where compromise joints were necessary in changing from one section of rail to another steel sole plates were welded to the rails, with filler plates to give a firm footing to the low rail



One of the double-truck safety cars purchased by the Altoona & Logan Valley Railway in its modernization program

Altoona Modernizes on a Three-Year Program

Expenditures made after careful analysis to put Altoona & Logan Valley Electric Railway and Logan Valley Bus Company properties on substantial basis

DURING the past three years the Altoona & Logan Valley Electric Railway and the Logan Valley Bus Company have spent more than \$1,000,000 on new track and equipment and an additional \$650,000 on maintenance of track and equipment.

The extensive program of improvements has been carried out by the railway and its bus operating subsidiary, serving Altoona, Tyrone and Hollidaysburg, Pa., and vicinity. There are 56 miles of rail lines, 26 miles of which are in paved streets, and 40 miles of bus routes. More than \$500,000 was spent for new track, paving and under drains, more than \$270,000 for safety cars and safety equipment for remodeled cars, and more

than \$93,000 for buses, a new garage and garage equipment. This paper has carried the news of these various projects from time to time as the work has been announced. The total amounts are given in accompanying tables.

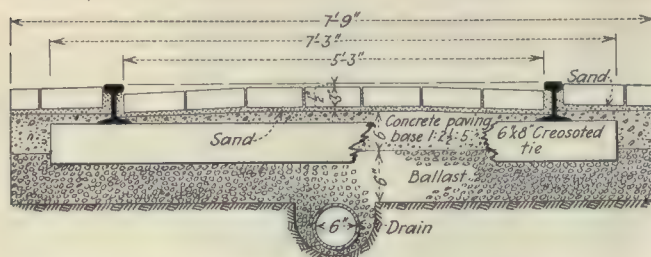
In the paved streets two types of track construction were used, depending on whether it was possible to reroute the traffic. Where the traffic could be diverted to another route during the reconstruction steel ties were used. Both Dayton and International ties were laid. Several of the pictures illustrate the progress of track laying. Track drains of 6-in. to 8-in. diameter, with catch basins or manholes every 350 ft., were in-



Where it was possible to reroute traffic steel ties were used in the reconstruction work. This view, taken on Allegheny Street, Hollidaysburg, shows the use of Dayton mechanical ties



Another stretch of reconstruction work where traffic could be rerouted shows progress of the work. International steel ties were used on this job



Standard type of track with wood ties. This is used where it is necessary to lay the track under traffic

stalled under all new track in paved streets on account of the marshy condition of the soil.

Where it was impossible to divert the traffic the track was laid with treated pine ties. The form of construction is shown in the line illustration. The ties are 6 in. by 8 in. by 7 ft. 3 in. long. First 6 in. of $\frac{3}{4}$ -in. clean stone ballast was tamped and flat rammed by air under and around the ties. Then a layer of 1:2 $\frac{1}{2}$:5 concrete 6 in. to 7 in. thick was laid for a paving base. On this a $\frac{1}{2}$ -in. sand cushion was spread to carry the 3-in. wire-cut lug paving brick. All the rail used for track in paving was of 100-lb. ARA-A section, except in a few special locations where Lorain section LS-122-491 girder rail was used. All the joints were fitted with sole plates and were seam welded.

During the three years in which this modernization program was in progress the company expended \$201,596 for street paving or \$67,199 annually. With an average daily service of 48 cars this would amount to \$1,400 per car per annum paving tax, the company states.

To do the rehabilitation work there were purchased and placed in service one resistance type welder and

IMPROVEMENTS CHARGED TO CAPITAL ACCOUNT

New track, paving and under-drains.....	\$533,436
Thirteen double-truck safety cars.....	212,065
Three Birney safety cars (transferred).....	13,464
Safety equipment for cars.....	45,376
Substations, feeders, etc.....	74,867
New bridges.....	42,795
Construction equipment—conveyances, welders, signals, etc.....	32,095
Seven Yellow 21-passenger buses.....	43,906
Two White buses (transferred).....	11,000
New bus garage and equipment.....	38,943

Total \$1,047,947

MAINTENANCE EXPENDITURES FOR THE THREE YEARS

Track and roadway.....	\$343,870
Equipment.....	244,915
Buses.....	67,482

Total \$656,267

one motor-generator type welder; two air compressors, one of which is electric driven and one gasoline driven, the latter being mounted on a Ford truck chassis; a set of tie tampers, flat rammers, concrete breakers and other track tools.

All the track in paved streets in which low joints and broken rails had developed was gone over and repaired. Joint repairs were made by installing sole plates, seam welding, surface welding and grinding, tamping four joint ties with dry concrete and relaying paving on the concrete base. Where the ties were cut or rotted under the joints they were cut out and joint boosters installed. Compromise joints are all being built up with plates and welded as shown in one of the illustrations.

In the open track all the joints were gone over, the broken plates were replaced, the bolts were tightened and the broken bonds renewed. The track was surfaced and lined. In the 25 miles of open track 25,000 ties were renewed.

During the past year particular attention was given to the overhead lines. An inspection was made of all the poles and trolley wire. The pole lines were renovated, the crossarms renewed and the wires rearranged. Bad stretches of trolley wire and heavy-duty curves were renewed. Worn splicers and ears were replaced. In doing the work 11 miles of trolley wire and 600 poles were installed. Since the work has been completed interruptions from line breaks and broken poles have been reduced about 70 per cent.

Fifteen sets of two-wire Nachod automatic car-counting signals were installed for city service and fourteen miles of telephone line were built for despatching cars in interurban service.

Thirteen steel-body, light-weight, double-truck safety cars of the latest type and three Birney safety cars have been purchased to give better service and to stimulate new business. One of the double-truck cars is shown in an accompanying illustration.

All of the cars already on the property have been equipped with safety appliances and adapted for one-man operation.

Power distribution has been improved by the installation of substations at various locations on the system. All of the feeders have been rearranged and redistributed, eliminating a large amount of copper, and all of the track bonding has been gone over and brought up to 100 per cent condition. These changes have speeded up the car service.

By agreement with the city of Altoona and the Pennsylvania Railroad the company has constructed a new bridge over the main line of the Pennsylvania. All the track and paving on the bridge approaches has been renewed. All the other bridges, which are owned outright, were sand blasted and given two coats of red lead.

The bus service has also been improved. The company purchased seven 21-passenger Yellow type X buses and two White buses. These have been installed on the 40 miles of bus routes to give better service and to improve the operating conditions. A new bus garage has been built and fully equipped.



Buses have been used to advantage in extending the routes of the Altoona lines. Some 40 miles of bus routes are in service

High-Speed Road for Germany

Engineers discuss engineering and financial features of proposed high-speed electric railway in Germany's industrial district. With few stops on grades and easy curves, a schedule speed of 71 m.p.h. is expected

By Walter Breslauer, Ph.D.

New York, N. Y.

DURING the past two years considerable space has been given in the German technical press to discussions of plans for a proposed high speed railway in the Ruhr industrial area in Western Germany. The latest extended contribution to the subject is a very comprehensive study of the engineering and financial possibilities of such a line by Dr. G. Kemmann of Berlin. In this report, besides making definite recommendations, the author reviews and answers adverse opinions to the plan, which came chiefly from another outstanding specialist in the field of city transportation, Prof. Giese, also of Berlin. Dr. Kemmann's report was made at the request of a company organized by the cities interested to study the entire subject of transportation in the district.

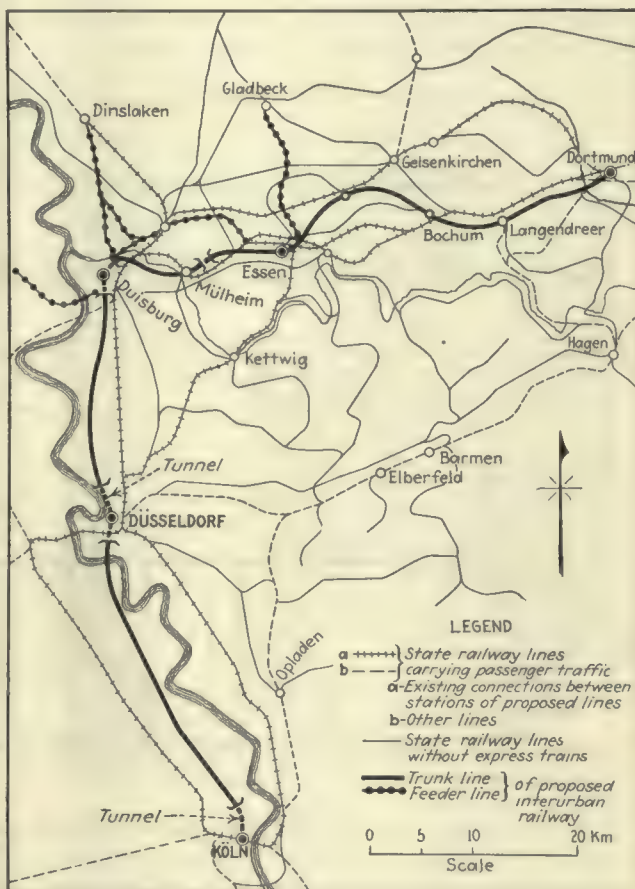
The first engraving shows a map of the area and the route of the high-speed railway, as proposed by the company mentioned. The district shown is one of the most thickly populated in Europe and contains the majority of the coal mines and steel mills of Germany, together with a large number of factories of all kinds. On the line of the proposed route there are ten cities with more than 100,000 inhabitants each, and six cities with from 25,000 to 100,000 population. In addition, there are ten other cities of from 25,000 to 100,000 inhabitants with contributory population. Altogether these 26 cities have about 4,000,000 inhabitants.

PHYSICAL CHARACTERISTICS OF PROPOSED LINE

The main features of the line, as proposed by the company organized by the cities to study the project and by Dr. Kemmann, are as follows:

There will be only nine stations, one each in Cologne (Köln) and Dortmund, the terminal cities, and the others at intermediate points. These stations are to be as near the traffic center of each city as possible. Through each city the road is to be built in subways or open cuts or on an elevated structure. Outside of the cities the road is on its own private right-of-way. There are to be no highway or railroad grade crossings and the grades are all curves are to be so designed as to interfere with high speed as little as possible. Besides the main line there are to be several branch lines with shorter distances between stops and lighter construction.

The maximum speed on part of the line, that between Cologne and Duisburg, is to be 81 m.p.h. On the section between Duisburg and Dortmund, the maximum speed is to be 62 m.p.h., partly because there are several grades of as much as 1.66 per cent and partly because the right-of-way passes over many mines, with danger of ground subsidences. On the branch lines the maximum speed is 50 m.p.h.



The proposed line traverses Germany's most developed industrial area

Trains are to be made up of combinations of two motor cars permanently coupled, each car being equipped with four motors. Electric power will be supplied at 1,500 volts d.c. and the motors are to develop 170 hp. (hourly rating). Multiple unit control will be used, with possibility of field reduction of 67 and 50 per cent for greater speed. Characteristic curves of the proposed motors are shown in the left-hand illustration on page 503.

Research has been undertaken by the Aero-Dynamic Institute of Göttingen University to obtain a shape of car body that presents the least resistance to the air, particularly in subways. A feature of the design, as shown in the accompanying engraving, is a cover for the trucks on the front end of each car.

According to European custom, two classes of passenger accommodations will be provided, corresponding to the second and third classes on the state railways on

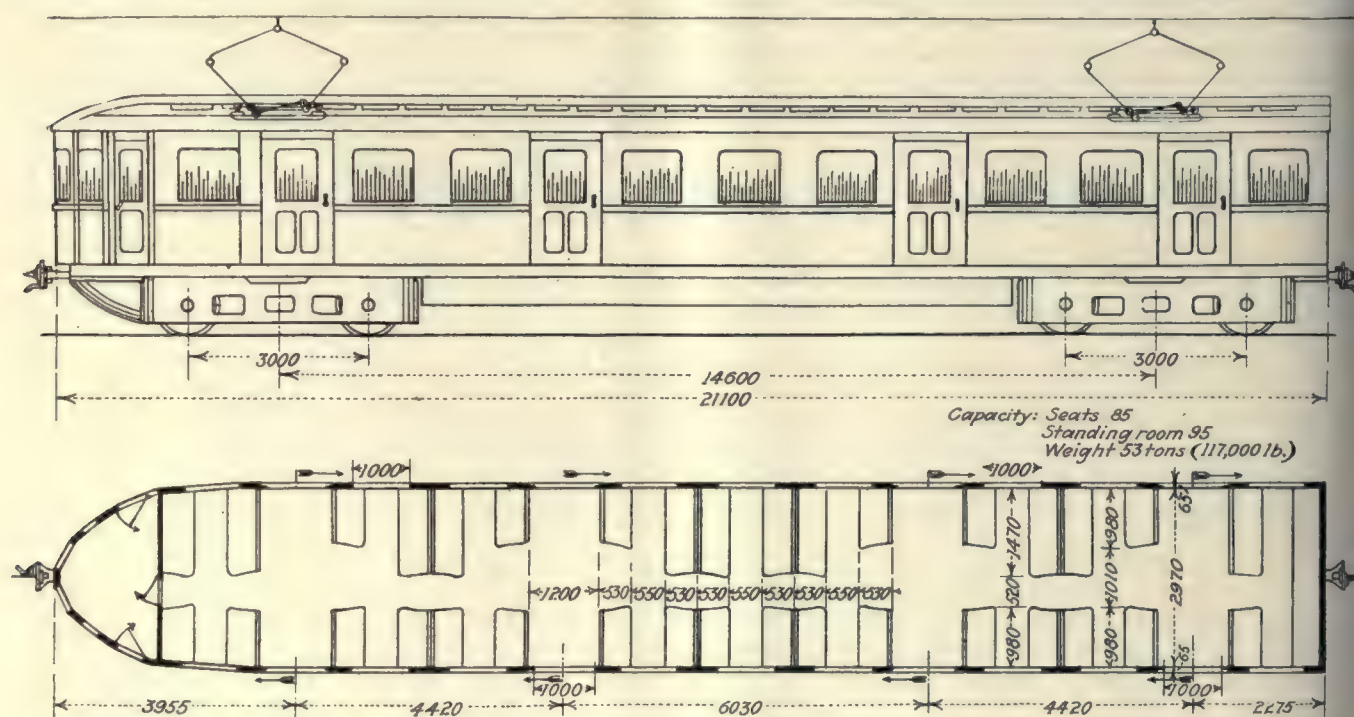
ESTIMATE OF INVESTMENT REQUIRED AND BUSINESS TO
BE DONE BY PROPOSED COLOGNE-DORTMUND
HIGH-SPEED RAILWAY DURING THIRD
YEAR OF OPERATION

	Kemmann	Giese
Total number of fares per year.....	36,000,000	20,000,000
Average length of passenger trip.....	15.3 miles	15 miles
Number of passenger-miles.....	551,000,000	300,000,000
Utilisation of seating capacity.....	33½ per cent	25 per cent
Number of car-miles.....	9,250,000	8,000,000
Capital to be invested.....	\$85,000,000	\$100,000,000
Average receipts per passenger-mile.....	1.8 cents	1.94 cents
Operating ratio.....	47.6 per cent	72.6 per cent
Profit.....	\$1,675,000	
Loss.....		\$2,750,000

which, incidentally, about 60 per cent of the commuter traffic rides fourth class. As the average estimated time per passenger trip is not more than twenty minutes, a ratio of 85 seats to room for 95 standing passengers was assumed. Platforms at the stations will be arranged to accommodate trains of six cars. On the branch line, a lighter car operated in single units is suggested.

miles (177 km.) in 140 to 150 minutes, all stops included. On the proposed line the running time will be only 77 minutes between the two cities, the distance being reduced about $2\frac{1}{2}$ miles (4 km.). The schedule speed during this trip, including the periods for acceleration and braking, but not including stops of one minute in each station, will average 71 miles (113.5 km.) per hour between Cologne and Duisburg and 51 miles (83.3 km.) per hour between Duisburg and Dortmund. To obtain these remarkably short running times, the train has to be kept at maximum speed, with motors running with reduced field, for as long as possible, and the coasting time has to be cut down to the utmost limits.

In the speed figures just quoted, Dr. Kemmann and his associate engineers have allowed only a small reserve in speed in the coasting period mentioned, because they believe this is warranted by the peculiarly favorable operating conditions such as uninterrupted right-of-way,



The proposed car is designed to reduce its air resistance

Power will be distributed at 25,000 volts to five substations equipped with mercury-arc rectifiers.

The automatic signal system is designed for a minimum headway of five minutes. It is expected that on the main line the headway will be 30 minutes, but between Duisburg and Dortmund a fifteen minute headway will obtain at certain times of the day. It is believed that if necessary a five minute headway can be maintained without delay even at the expected speed.

SPEED-TIME CURVES

The upper-right chart on page 503 shows a group of speed-time curves of runs, based on the proposed maximum speed of 81 miles (130 km.) per hour. It is obvious from these that such speeds would not be economical in frequent-stop service as the trains would have to cover at least 3.75 miles (6 km.) before the maximum speed is reached and, to provide adequate coasting the stops must be at least 15.6 miles apart.

The express trains on the existing steam railroads cover the distance between Cologne and Dortmund, 73

etc. This action is criticised by some other experts who argue that the few seconds which might be gained if the motors are run at full capacity until braking is begun is not sufficient to allow opportunity to make up for lost time.

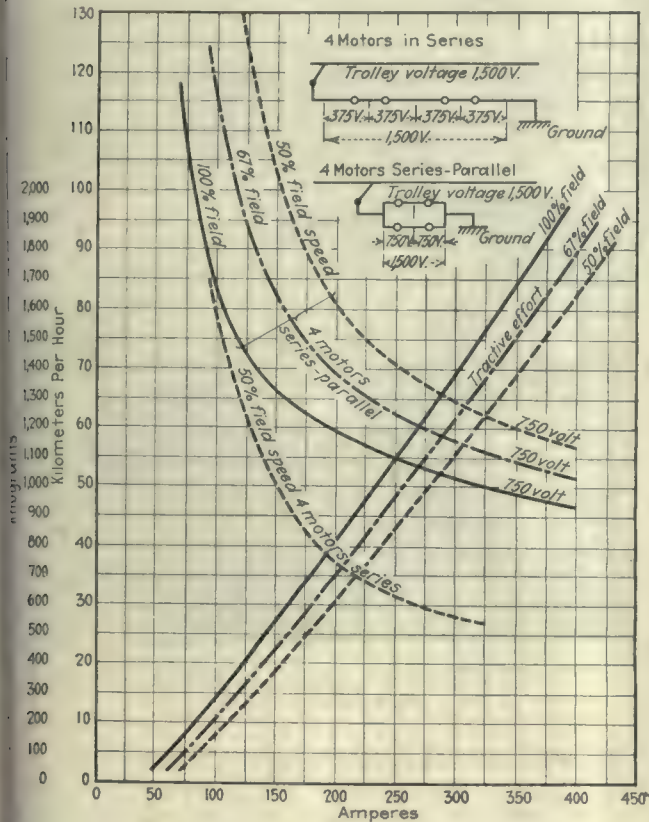
The rate of acceleration selected is 1.1 m.p.h. per second (0.5 meters per sec.²). This corresponds to the input of 1,400 kw. for each two-car unit when starting. When running on level tangent track at constant speed with a 50 per cent field, each two-car unit will have a continuous input of about 750 kw.

The third chart on page 503 gives the consumption of energy by trains at different maximum speeds and distances between stops. The point A on this chart represents the conditions on the main line between Duisburg and Dortmund, B those on the branch line and C those on the Berlin subway. On the basis of this chart Dr. Kemmann claims that the watthours per ton-mile, even on the short distance section between Duisburg and Dortmund, will be less than on the branch line and that, in turn, less than on the Berlin subways.

The main line of the proposed railway runs approximately parallel to the main line of the state railroad system, with which it would be in direct competition. Nevertheless, its advocates believe, it has a distinct economic field.

In the first place, the capacity of the existing transportation facilities is now overloaded, complicated as they are because of the necessity of giving service to many scattered factories and mines. Besides this freight traffic, the existing steam railroad lines would still have to care for the through passenger express trains, a

district might better be obtained by an expansion of the existing facilities. Dr. Kemmann's report, however, outlines the difficulty of such a development, especially the costly widening of right-of-way required in the cities, the complications at junctions with numerous branch lines and the difficulties of increasing the speeds of the steam operated trains, especially in the hilly districts around Essen. While the adoption of electric power for the local express tracks would improve conditions, the routes in use are not so well adapted to high speeds as on an independent system of the type consid-



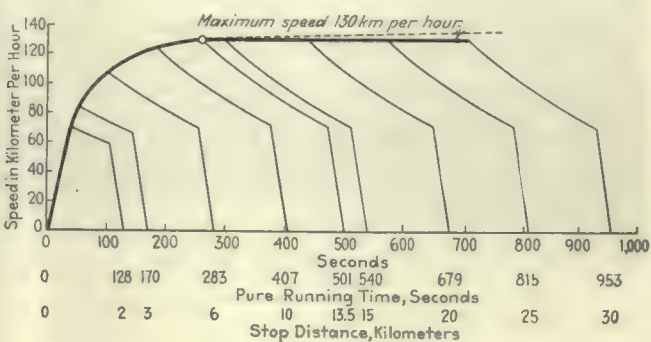
Characteristic curves of motor selected. The motors will be designed to develop 170 hp.

large number of which pass through this district. It would still also have to care for the local traffic, which is not being carried by the present interurban electric railways or buses.

The new line would be primarily for the high-speed interurban business between the nine cities mentioned. Dr. Kemmann estimates that in the third year of operation (1933), 60 per cent of the passengers carried will represent those who otherwise would have used the parallel steam railroad, electric railways or buses, and 40 per cent will be newly created business, resulting from closer connection of the city centers. It is also believed that the hourly distribution of the traffic will be equalized better than on the existing railways, which chiefly serve commuters. Both terminals of the main line are in very large cities, so it is expected that the through traffic on the line will be a large and constant percentage of the business done.

There is considerable difference of opinion between Dr. Kemmann and Prof. Giese as to the financial results to be expected during the third year. The figures of each are given in the accompanying table.

Certain critics of the proposed line have claimed that the needed increased transportation facilities in this



Speed-time-distance diagram for different lengths of run

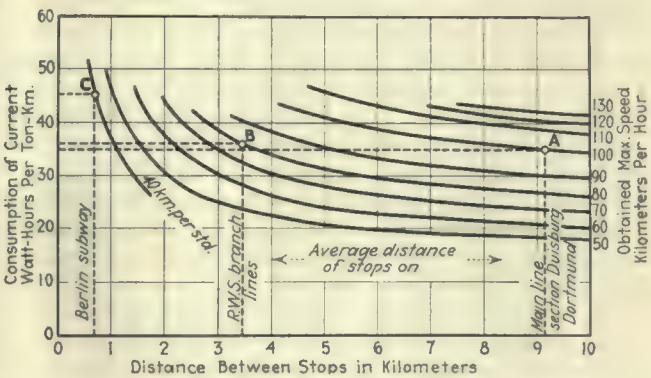


Chart showing energy consumption in relation to distances between stops and maximum speed

ered. Moreover, the cost of the necessary trackage rearrangement would be equal to that of wholly new construction.

As against these claims, it can be argued that the present economic conditions in Germany may make preferable a plan which permits the distribution of the expense over a longer period. The latest reports from Germany are that the directors of the state railway system have approved the expenditure of 300,000,000 marks during a period not yet fixed for improvements of the existing systems in the Ruhr. This decision was reached on the theory that even if the new road is built, the existing system must still handle the through business, the local commuters, and all freight traffic, for which new facilities are badly needed.

The latest contribution to the subject is a pamphlet recently issued by Dr. Kemmann. It contains the principal criticisms of the report which have been published in the German technical press, together with Dr. Kemmann's replies. The criticisms relate particularly to the feasibility of the short running times allowed in the report, to the volume of traffic to be expected and to the economic outcome of the entire high-speed plant as proposed.



Seven bays are devoted to washing motor coaches

Bus Wash Rack

WASHING of buses is facilitated by a new wash rack just completed in the garage for the motor coach division of the Los Angeles Railway, Los Angeles, Cal. It is built of steel and brick, 37 ft. 1 in. wide by 123 ft. 6 in. long. There are seven bays for washing motor coaches and automobiles, one-half bay for cleaning parts, an equipment room and a locker room above this for the car washers. The locker room contains a full-length steel locker for each car washer. It also has benches for the workmen and a lavatory with hot and cold water.

The equipment room, which is on the ground floor, contains two high-pressure U. S. compressor pumps, hot water heaters, and solution tanks. The hot water heaters are controlled thermostatically. Five lines run into the intake manifold of each pump. They are (1) cold water, (2) hot water, (3) soap, (4) Oakite and (5) distillate. The valves and piping are arranged so that any one of these liquids or any combination of them may be turned into the intake manifold of either pump. The head car washer decides the liquid or mixture of liquids that is to go through each pump and turns the right combination into the pump manifold by adjusting the valves.



The equipment room contains high-pressure pumps, hot water heaters and solution tanks



Cleaning a bus in Los Angeles by means of the new high-pressure system

Each pump is capable of delivering continuously 4 gal. per minute at a pressure of 300 lb. to any four outlet nozzles of the high-pressure pumping system. Each pump is connected to a 1½-in. high-pressure pipe line that runs the entire length of the wash rack. A ¾-in. line is tapped off each of the pump lines at intervals and runs to the four corners of each washing bay. The ¾-in. lines from each of the two pumps are joined to a common high-pressure hose outlet. Each line is arranged with a globe valve and a check valve. The globe valve regulates the flow of liquid and the check valve is intended to prevent the entrance of liquid from the other pump line.

With this arrangement a washer may use the liquid of either high-pressure line or any combination of liquid contained in the two lines. There is a remote-control system with a push button located at each high-pressure hose outlet, so that from his station a washer may cut off the pump. However, these buttons are arranged in parallel so that all stations must have their circuits open before the pump stops operating.

Each bay is arranged with high-pressure air hose for blowing off the water after the bus has been washed. The room for cleaning parts has two high-pressure hose outlets and high-pressure air outlets similar to those in the washing bay. City water outlets are in all washing bays and in the room for cleaning parts. One of the washing bays is arranged with a pit, so that the chassis and underneath parts of motor coaches and automobiles may be washed more readily.

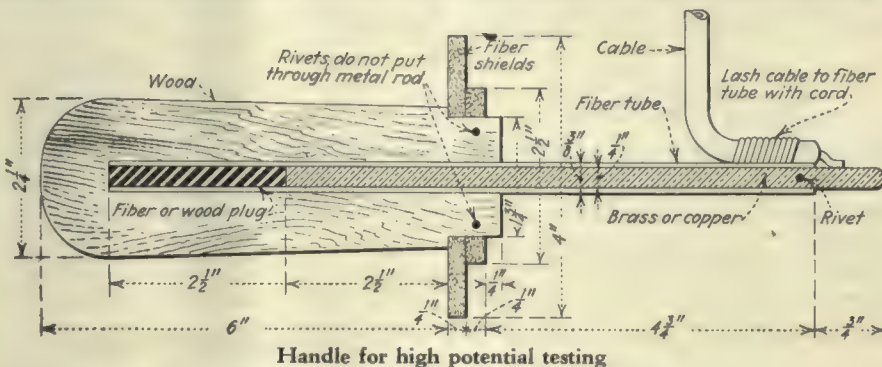
Maintenance Methods *and* Devices

Simple, High-Potential Testing Outfit

By R. S. BEERS

Railway Engineering Department General Electric Company, Schenectady, N. Y.

MOST of us visualize a high-potential testing outfit as an elaborate and expensive piece of apparatus. Actually, any repair shop can have one at a low cost by purchasing a standard 1½-kw. lighting transformer that has a primary winding for 2,200 volts and a secondary winding with taps for both 110 and 220 volts. By connecting this secondary to the usual 110-volt a.c. lighting circuit, a potential of either 110 or 2,200 volts may be obtained. The former is recommended for testing overhauled or repaired motors, armatures, fields, etc., while the 2,200 volts should be used for rewind



to the apparatus. For safety it is customary to surround the device being tested with a simple barrier such as a cord or white tape. The other method is to attach insulated handles to the ends of the high-tension leads and touch these while alive to the apparatus. A barrier around the apparatus under test is not ordinarily used, as the tester is near by and gives sufficient indication of danger.

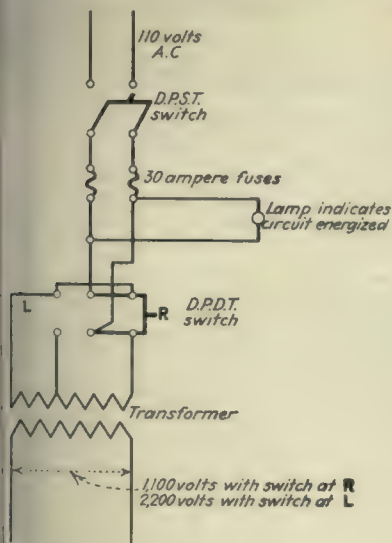
An insulated handle that is easy to make and that has been used with success is shown in the accompanying illustration. The insulating properties of the wood from which these handles are made can be greatly increased by drying the wood out in the armature oven and then soaking in linseed oil for a day or so. This will fill the pores of the wood with oil and prevent moisture from entering.

The sketch shows the metal core about 2½ in. shorter than the fiber tube, the idea being to give ample creepage distance from the live metal along the surface of the fiber tube.

A simple indicator to show when the transformer is energized may be made by using a colored lamp connected across the 110-volt side of the transformer. If a sign flasher is used, this light can be made to blink.

To Check Alignment of Brush-Holder Parts

MANY of the troubles with railway motors can be traced to improper location of the brush-holder in the motor frame. To make certain that all parts of the brush-holder itself are in proper alignment before installation the Third Avenue Railway, New York City, uses in its 65th Street shop, the special fixture illustrated. It is shown with a Westinghouse type 310 brush-holder in position. The brush-holder itself is held firmly at the carbon box end by a clamp which has a metal block that fits inside the carbon box. This insures that the brush-holder frame is lined up carefully with respect to the finished inside of the carbon box. The upright studs are checked for alignment by a gage on the opposite end of the fixture. The two upright

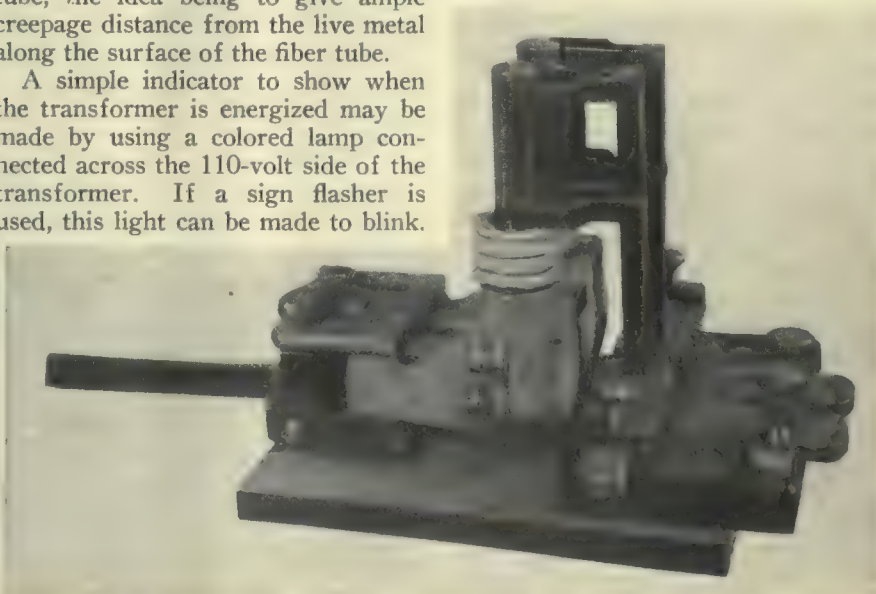


Connections for high potential test

armatures and any other essentially new parts.

The other parts for the complete outfit are two 110-volt knife switches, fuses and high-tension leads which can most easily be made of automobile ignition cable. The high-tension leads should be in uncut lengths without breaks in the rubber covering.

There are two divergent methods of testing a piece of apparatus with high potential. One is to terminate the high-tension cable in a bare wire or hook and always be sure the leads are dead when they are attached

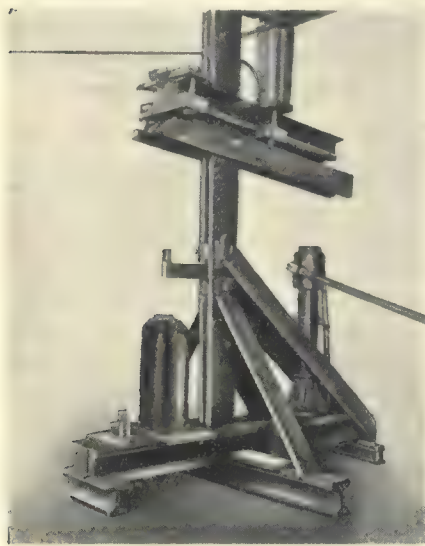


Fixture for checking brush-holders for alignment of various parts

arms are arranged so that they will slide sidewise or back and forth and when in correct position, they are clamped by setscrews. With this arrangement the upright studs can be checked quickly and accurate alignment with respect to the finished inside of the carbon box is assured.

Hydraulic Press

IN THE shop of the Binghamton Railway, Binghamton, N. Y., work accumulated due to the absence of a suitable press. This became quite serious at times and finally it was found necessary to design and construct a hydraulic press. The press



Simple hydraulic press

constructed is shown in the accompanying cut.

The foundation consists of three pieces of 80-lb. tee rails resting upon the floor. The base of the press is made of two pieces of the same rail with the space between filled with metal. They are tied together with $\frac{3}{4}$ -in. bolts and welded. The post is made of two pieces of 1 in. x 6 in. steel spaced 1 in. apart by fillers, bolted to each other and to the base rails. This post is drilled with seven $1\frac{1}{2}$ -in. holes at the top to permit raising or lowering the rams to take care of various kinds of work.

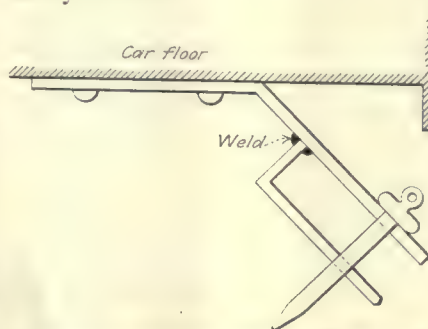
There are two press rams, one for light work and the other for heavy work. The light ram is made from 1-in. x 4-in. material whereas the heavy ram is made from 80-lb. tee rail. These rails are bolted together and filled in the same as are the base rails. Two heavy clamps give additional strength. When the heavy ram is to be used the light ram is removed, but the light ram can be used with

the heavy ram in position. Additional rigidity of the post and ram is obtained by 1-in. x 4-in. braces fastened to the foundation and base rails. The leverage of the rams is two to one and the hydraulic power is obtained by a 15-ton hydraulic hand jack mounted on the base directly under the ram extension. The bed which is shown in the illustration resting upon the base under the ram is made of a piece of $3\frac{1}{2}$ -in. pipe welded to a $9\frac{1}{2}$ -in. x 16-in. x 1-in. plate. Four ribs $\frac{3}{4}$ in. thick are welded to this pipe and to the base. This press has afforded a means for increasing production.

Coupling Bar Holders

CONSIDERABLE trouble has been experienced by the Cincinnati Street Railway, Cincinnati, Ohio, in pushing disabled cars around sharp curves with the ordinary coupling bar. In an effort to solve this difficulty satisfactorily a bar has been developed with which a car may be moved around any curve on the property with ease.

This bar is 8 ft. 3 in. long and is made out of $2\frac{1}{2}$ -in. heavy pipe. A feature of the arrangement is the method employed for suspending the bar when not in use under the side of the car. The jaws of the hanger open downward and the bar, once inserted, is held securely in place with coupling pins. The bar is so long that it must be carried in the brackets and the position of the hanger jaws insures having two coupling pins handy for use.



Arrangement of coupling bar holders under floor of street car

Rack for Soldering Irons

SYSTEMATIC arrangement and accessibility of tools in a shop usually reflects the quality of work being performed. Foreman armature winder Max Siebner of the New York



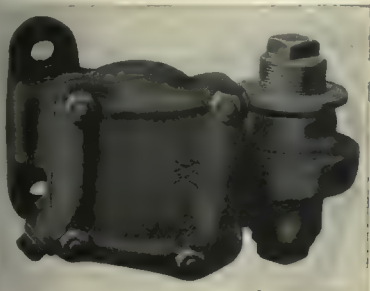
Rack used for soldering irons in the Woodside shops of the New York & Queens County Railway

& Queens County Railway, Jackson Heights, N. Y., believes that this is very important and has arranged all tools in his section of the Woodside shops in this manner. The accompanying cut shows one of the heating furnaces with its soldering iron rack. These irons are in clear view and a minimum of time is required to select the proper one for the job on hand. All irons must be in place on the rack when not in use. A careful check is made every night to see that all have been returned and are in place. The rack consists of a piece of $\frac{1}{2}$ -in. flat steel bar drilled on either end for mounting and notched to permit of suspending the various irons. It has improved the appearance of the shop and eliminated loss of time in looking for a certain iron.

New Equipment Available

Feed Valve Adjustment Made Easier

IMPROVEMENTS have been incorporated in a feed valve, called the C-8, developed by the Westinghouse Traction Brake Company, Wilmerding, Pa., and now available for use with air-brake equipments.



Increased maintenance is made possible by the use of this new feed valve

The new design facilitates maintenance of correct adjustment at low cost.

A larger ring-fitted supply piston, with definite size by-pass choke, replaces the loose fitting piston of former designs, assuring more positive and reliable performance. The piston stem guide is larger, which reduces wear and insures correct alignment of the piston, while the helical shaped periphery of the guide tends

to keep the bush scraped free of dirt.

All wearing parts can be removed readily without special tools. Slip bushings are used throughout, while the slide valve bushing and piston bushing are in one piece.

Three New Welding Outfits

MEETING the demand for low-price assemblies, three new welding outfits have been placed on the market by the Oxxweld Acetylene Company, New York, N. Y. These outfits are made possible by the addition to the Prest-O-Weld line of two small two-gage regulators, and two special blowpipe tips, one for heating and brazing, and the other for soldering.

The type W-101-A outfit is for use where only an occasional welding job needs a large size blowpipe for straightening operations. For this purpose a No. 10 tip is included which is also suitable for reasonably heavy welding operations. A No. 6 tip is also provided for the usual type of welding job. A special heating tip and soldering tip which consume acetylene only, are designed for light brazing and for soldering.

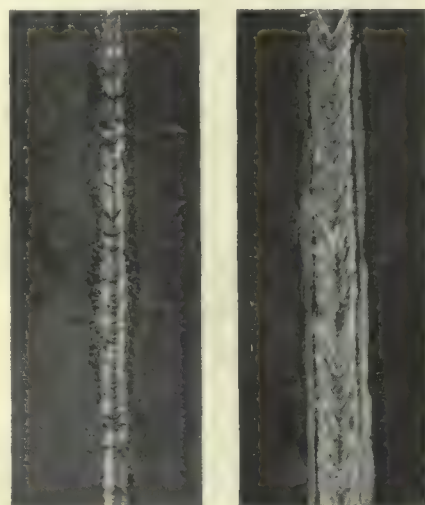
The type W-102-A general purpose outfit, is for shops that wish to employ the oxy-acetylene process in all of its many applications, welding, de-

carbonizing, heating, soldering, brazing, lead burning and other repairs. Five welding tips and a decarbonizing blowpipe as well as the heating and soldering tips are included in this outfit.

The type W-102-B welding outfit is recommended for welding light and medium castings. It is also suitable for sheet metal work and for light production welding such as is used in tanks, steel window frames and similar work. This outfit includes five welding tips.

New Arc Welding Process Developed

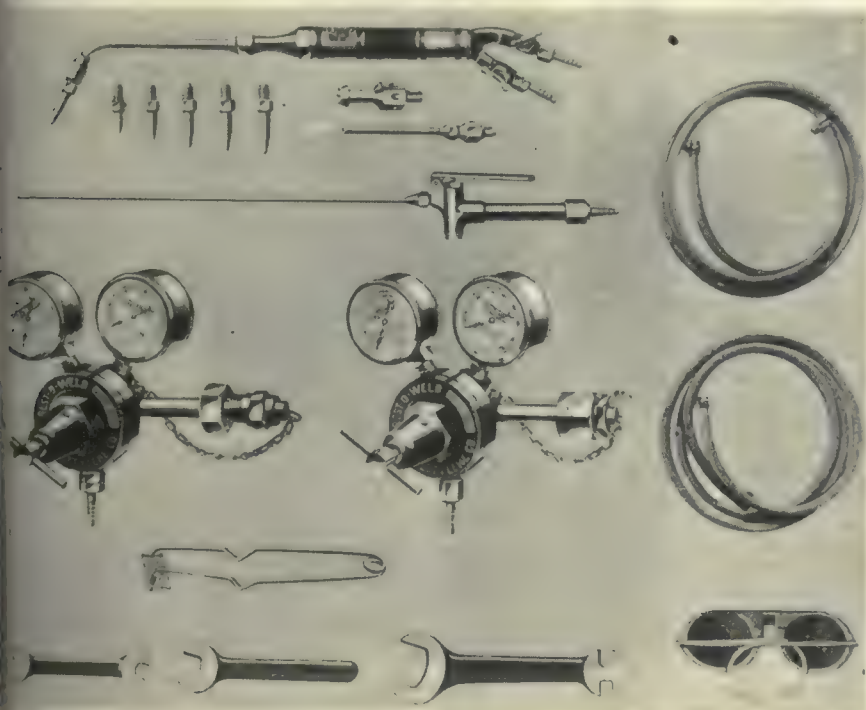
DEVELOPMENT of a new arc-welding process termed by the manufacturers the "Electronic Tornado" is announced by the Lincoln Electric Company, Cleveland, Ohio. In it a specially induced magnetic



At left is shown a metallic arc weld; at right is one made by the "Electronic Tornado"

field alters the ordinary characteristics and effects of the welding arc.

The company predicts its adoption for automatic welding in the fabrication of cars, tanks, pipe lines, box girders, etc., but it is not expected to find immediate use in hand-welding operations. The metal deposited in the weld by the ordinary electric arc process has characteristics like those of cast steel, while that deposited by the new process is said to have equal or better physical characteristics than the metal of the plates joined by welding, due to the purifying effects. The smooth finish obtained with the process is said to be due in part to the high speed of travel of the welding heads and in part to its inherent characteristics.



One of three new welding outfits, the Type W-102-A for general purpose work

Association Activities

The Santa Claus Idea of Government*

BY HENRY SWIFT IVES

Vice-President Casualty Information Clearing House, Chicago

GOVERNMENT ownership is an attempt to transform the state into a benevolent Santa Claus doing everything for everybody at no cost to anybody. Presumably, the old feudal doctrine that the government should support the people has long since been discarded in favor of the theory of democracy that the people should support the government. The continuing agitation for government ownership and control of industry, however, belies that assumption.

There is, of course, a very potent lure in this Santa Claus idea of government, and that is why it has survived through so many centuries. Gift-government

baubles as railroads, insurance companies, electric light and power plants, coal mines, gas plants, street railways, grain elevators, oil wells and the like awaiting the glad day when the red-clad Kris Kringle will appear and pass them about among the faithful. He promises a golden age of luxury, idleness and wastefulness in which government deficits will be substituted for private profits and in which politics instead of business and work will become the national dividend producer.

There is nothing particularly new in the idea of transmuting profits into gratuities through the alchemy of socialism, but the headway it has made in a country dedicated to liberty and resting on the sound foundation of private enterprise is rather surprising. Government ownership and the imperious regulation and control of industrial processes by the politically minded take away the very fundamental rights of man which the American commonwealth was designed to foster and protect, and their inevitable consequence is despotism. It is about time that property owners and business men take stock of this situation and appraise the growing tendency towards confiscatory legislation more fully.

ARDENT CAPITALISTS BECOME SOCIALISTS

always has been popular among certain classes. Getting something for nothing never loses its appeal. Pilfering politicians thrive on such schemes, professional uplifters count on them to provide sustenance not only for their hobbies but for themselves, and socialists advocate them deliberately as a curb to prosperity, for prosperity spells the doom of socialism. Those who are subsidized seldom complain of the subsidy or investigate its source.

HAS NO PLACE IN DEMOCRACY

It seems illogical, however, and almost tragic, that in a country which has prospered and grown great because of its espousal of democracy in its most virile form, the greatest threat against continuing prosperity is the rejuvenation of the long outlawed theory of government of which Santa Claus is the patron saint. The political Christmas tree, indeed, is now being trimmed and festooned with such gewgaws and

*Abstract of address delivered at the joint convention of the Illinois Gas Association, the Illinois State Electric Association and the Illinois Electric Railway Association, at Springfield, Ill., March 14, 1928.

This unfortunate division should be speedily remedied if an ultimate surrender to socialism is to be avoided.

The business man and property owner who secretly feels that he may gain some privilege or make a saving if somebody else is repressed by the strong arm of the state is an economic illiterate.

INSURANCE COMPANIES AND UTILITIES HAVE COMMON INTEREST

A large number of the leading stock casualty insurance companies of this country are face to face with this government ownership problem. In sixteen states workmen's compensation insurance is now being written in so-called state funds in competition with or to the exclusion of private companies. Despite the fact that this type of govern-

It ought to be an axiomatic political principle that no single industry or business can be lifted out of the mass of privately conducted enterprise, endowed with the attributes of sovereignty, subsidized by taxation and operated by a political bureaucracy without every other privately conducted business feeling the baneful and depressing effects of such a procedure.

ment ownership has proved a striking economic and social failure—evidenced by the fact that in the nine states where competition is permitted the private companies write 85 per cent of the business and the state funds only 15 per cent, notwithstanding a substantial saving in rates—attempts are being made to extend it to other lines, such as automobile liability insurance and the like.

Two states, Wisconsin and Massachusetts, also have life insurance funds, and in several states and municipalities the government ownership idea has been expanded to include funds for insuring public buildings against fire and, for the bonding of public officials. The disastrous experience of several of the Western states with hail insurance is well known. This brief survey of the situation in the business which I represent ought to lead to the conclusion that all insurance men are bitterly opposed to all kinds of government ownership because of their own afflictions. But that isn't necessarily true. I do not doubt that there are many insurance men who at some time or other, have advocated state or municipal ownership for elec-

There would appear to be altogether too many business men in this country who are ardent capitalists when their own business is concerned, but who are apt to be just as ardent socialists when the other fellow's business is concerned. This class has had more to do with the headway made by the socialization movement than have all of the socialists and ordinary mine-run of pink agitators combined. One has only to examine the background of any government ownership scheme to discover the support given to it by substantial business men not engaged in the business affected. When government competition, regulation and control, however, touches them these same business men are loud in their protests and cry to high heaven to save them from the socialists.

The community of interest between all of the jeopardized industries to a large degree seems to be ignored. Each is fighting its own battles with little or no thought of the common menace. Often those most in danger are arrayed against each other and do not seem to care what becomes of the others "in the same boat," provided they themselves can keep a few feet ahead of the socialist sheriff with his writ of ejectment.

tric light and power plants, street railways and gas companies. I do doubt, however, if there is an active insurance man who ever has advocated government ownership of insurance.

In the same way I do not doubt that there are public utility executives and owners who, at some time or other, may have advocated and supported state insurance. I doubt, however, if there is a public utility executive or owner who ever has advocated government ownership of his particular business.

To both of these groups I wish to say that they ought to be just as much opposed to government ownership of any other industrial enterprise as they are opposed to government ownership of the enterprise in which they are engaged. It ought to be an axiomatic political principle that no single industry or business can be lifted out of the mass of privately conducted enterprise, endowed with the attributes of sovereignty, subsidized by taxation and operated by a political bureaucracy without every other privately conducted business feeling the baneful and depressing effects of such a procedure.

As long as this condition of chaotic political and economic thinking continues among the avowed supporters of democratic institutions—and these constitute more than 90 per cent of our population—the socialization movement, with its gift-government decoy for the unsophisticated always in the foreground, will continue to make progress.

There are many pitfalls which must be avoided if legitimate private enterprise is to be preserved in this country, and if individual initiative is to remain unfettered. The chief of these are the gradually growing American tendency to look upon capital with suspicion, to denounce large profits as immoral if earned by others than the denouncer, to yield to the delusion that wealth which is confiscated will continue to be created, to believe that the public can add to its possessions by taking property from individuals, to hold that compulsory equality of condition is more to be desired than unrestricted equality of opportunity, and to think that the leveling process can be accomplished by subsidizing mediocrity at the expense of genius. All of these are fundamental economic distortions.

PROGRESS DEPENDENT ON PRIVATE ENTERPRISE

After all, no material benefit has ever reached mankind except through the agency of private enterprise. To deny its potency is a confession that democracy is a failure. To shackle it with the chains of state slavery is equivalent to affirming that men can conduct governments better than they can conduct their own business affairs, a statement which history has denied from the dawn of recorded time until the dawn of today. In my opinion, the leading industrial enterprises of this generation—"big business," if you please so to designate them—are being conducted with a higher degree of fairness and justice to

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those engaged in them, with a more sympathetic regard for human aspirations and ambitions, with a keener sense

of their responsibility to the people and to the nation, and with a more searching appreciation of the more lofty ideals of service, than any similar or comparable government enterprises on the face of the earth. I say that industry can run itself and is today running itself better than any government is being run. There is no "if" about it. The only effect of radical state interference is to supplant order with confusion. Industry today is for the most part two jumps ahead of the requirements of the people; most governmental organizations are two jumps behind.

Railway Engineering Association Holds Meeting in Chicago

ATTENDANCE at the convention of the American Railway Engineering Association, held on March 6-8 in Chicago, was larger than at any previous meeting. The registration, through March 8 was 968 members and 348 guests, or a combined total of 1,316. Last year the total was 1,251, and in 1926 it was 1,030. An exhibit was held, as usual, in the Coliseum building. There was a concurrent exhibit of signal apparatus, and the American Railway Association, signal section, held a two-day meeting on March 5-6.

At the railway signaling meeting, the recommended code on colors and forms for traffic signals for highway vehicles, as approved by the American Engineering Standards Committee on Nov. 15, 1927, was submitted by the committee on highway crossing protection. Later, highway crossing signals were again considered in the report of the committee on grade crossings of the A.R.E.A., when a standard highway crossing sign, carrying the words "Railroad Crossing" was recommended by the committee.

Brief abstracts of some other reports presented at the convention of the A.R.E.A., selected as of especial interest to electric railway operators, follow:

TIES

Among the subjects investigated during the year were anti-splitting devices for wooden ties, of which a number were tested at the Altoona laboratory of the Pennsylvania Railroad. The tests were made on 14-in. tie sections in which a $\frac{1}{4}$ -in. slot was cut from one end of the block to within 3 in. of the other end. The anti-splitting irons were then pressed into the ends of the block so that they extended across the slot, and a wedge was driven into the slot. The conclusions, in brief, were: (1) An anti-splitting device should be straight where it crosses the split or check, rather than curved; (2) it should cross the split at right angles; (3) "S"-irons with a small perpendicular lug at the end have more holding power than the standard "S"-irons; (4) the holding power of a device with a right-angle bend supported by an end lug is slightly

in excess of the standard "S"-iron with end lug.

Another subject studied was the holding power and thrust resistance of spikes in various kinds of wooden ties. Five thousand tests on this subject were made in the test department of the Santa Fe Railroad. More damage to the wood fiber was found when no holes were bored, or where the holes were too small. The recommendations were: (1) that holes for cut spikes in hard wood be $\frac{1}{8}$ in. smaller than the diameter of the spike; (2) that holes for cut spikes in soft wood be $\frac{1}{4}$ in. smaller than the diameter of the spike. Tests so far indicated that the chisel edge of the spike should be slightly less than the diameter of the hole.

ELECTRICITY

The report of this committee also comprised the report of the electrical section of the American Railway Association. Reference will be made to the longest sections of the report. One of these was a preliminary draft of specifications for catenary construction, though the committee points out that these specifications are subject to further revision, particularly such parts as relate to loading, unit pressures, and clearances. Further consideration of these features, it says, should be deferred until sub-committee No. 5, jointly with the N.E.L.A., concludes the preparation of wire crossing specifications satisfactory to the railroads. Another extended section in the report related to standardization of insulators, on which the sub-committee has been working with the American Engineering Standards Committee and the Bureau of Standards, for the purpose of reducing the number of varieties of one-piece porcelain insulators. Another extended section related to specifications for track and third-rail bonds. Formulas and charts giving the resistances of different types of bonds are given, with recommended methods of installation, testing, etc. For manganese track rails, the committee reports that the manufacturers advise against the use of heat-applied bonds and recommend mechanically applied bonds. On this point, the

committee studied the possibility of field drilling of bond holes in such rails, and found it could be done with a machine that will give a heavy rigid feed and low speed. Another extended report related to the design of indoor and outdoor substations. Other subjects were treated, but less extensively, than those mentioned.

ECONOMICS OF RAILWAY OPERATION

The most extended division of this report was on the effect of motor truck and bus lines on branch or feeder steam railroad lines. It was shown that as compared with ten or twelve years ago, steam railroads have been losing their short-haul passenger traffic to the buses. The number of passengers carried, passenger-miles run, passenger revenue and revenue per passenger-mile have all decreased on Class I railroads, as compared with 1920 or 1921. The reasons for public preference for travel by motor coach are given as lower fares, frequency of service, and "store-door" principle of passenger service. The committee believes that the railroads should give serious consideration to the use of highway motor coaches and rail motor cars, when their use as a substitute for steam service will result in larger net income or reduction in operating loss. The committee believes that recent decisions of state courts are favorable to the right of the existing rail carrier to furnishing such highway transportation as is needed.

TRACK

The most extended section in this report related to track construction in paved streets, where the committee presented for adoption and recommended practice a series of plans of ironbound manganese center frogs for 7-in. and 9-in. girder rails. The committee has under consideration plans for grooved tongue switch and mate for industrial track and connected tongue switch for main line use, as well as plans for ironbound manganese insert crossing, all for presentation in a report at a later date. A short section in the report referred to methods of reducing rail wear on curves with particular reference to oiling the rail or wheel flanges. The statement was made that quite a number of railroads are oiling rail and flanges both by hand and with devices made for this purpose and that desirable economies can be effected thereby. Wear on the high rail of the curve is greatly reduced, the life of ties is lengthened due to less regaging, less tread wear occurs on the low rail, curve resistance is lessened, and there is reduced wear on flanges. It is essential that the proper oil be used. The viscosity of the oil is important as it must be sticky enough to adhere to the flanges for application to the rail ahead and must function through a considerable temperature range. It is also essential that the oil be continuously applied, either to the wheels of every train using the track or to the rail ahead of every train, as less frequent applications of oil are not satisfactory.

Purchasing Agents Select Kansas City for Next Convention

MAY 28-31 has been selected as the time for the thirteenth international convention and exhibit of the National Association of Purchasing Agents. It will be held in the American Royal Building, Kansas City, Mo.

The convention program this year is being prepared to cover purchasing of commodities. There are also functional groups, such as the public utility group, composed of purchasers for the utilities. In this division purchase policy, association under particular connections with vendors, contacts with engineers in their own departments, standardization of particular problems, and similar topics will be covered.

Weekly Engineering Index Service

WEEKLY publication of an engineering index service is announced by the American Society of Mechanical Engineers. This is an extension of the old *Engineering Index*. By this service valuable material in 1,700 publications received by the United Engineering Societies Library is reviewed by a staff of editors qualified by practical field experience. Each article is then described in a carefully prepared note, and these notes are classified under one of the thirteen subject headings in which the different phases of the engineering interest are listed. They are then printed on index cards, convenient for filing, and sent each week to subscribers.

The classification "Railroads and Railways" is subdivided as follows:

12. Railroads and Railways:
 - A. Accessories—Signals, train control devices, etc.
 - B. Construction—Right-of-way, tracks, ties, stations, yards, etc.
 - C. Locomotives—Design, construction, operating, etc.
 - D. Railroads—Operation, management, etc., of trunk and main-line railroads.
 - E. Railways—Operation, management, etc., of street, and interurban railroads, subways, elevated railways, etc.
 - F. Rolling Stock—Car building, lighting, heating, etc.
 - G. Shop and Shop Equipment—Repair shops, roundhouses, equipment, etc.
 - M. Miscellaneous—Other subjects relating to railroads not otherwise classified.

For information concerning this service, together with sample index cards, address Major Carlos de Zafra, director, the Engineering Index Service, 29 West 39th Street, New York, N. Y.

City Planners To Meet in Texas

FORT WORTH and Dallas, Tex., will be hosts to the twentieth meeting of the National Conference on City Planning, which will be held in those cities May 7-10. The session of May 7 will be held at Fort Worth, after which the party will take buses to Dallas, where the meetings will be held.

Among other things a number of

papers on street traffic planning and other topics of interest to transportation men are included. Those intending to attend are urged to communicate with Flavel Shurtless, secretary of the National Conference on City Planning, 130 East 22nd Street, New York City.

New York Alumni to Discuss Transportation

"SOME Interesting Steps in Transportation, Past, Present and Future," will be discussed by the New York Alumni Association of Tau Beta Pi, co-operating with the New York sections of the Founder Engineering Societies, at a meeting to be held in the main auditorium of the Engineering Societies Building, 29 West 39th Street, New York City, Thursday, March 29, at 8:15 p.m.

The speakers will be Daniel Willard, president Baltimore & Ohio Railroad; Major-General John F. O'Ryan, president Colonial Air Transport Company, Inc.; and Edward Hungerford, director Baltimore & Ohio Centenary, who will present a film, "The Fair of the Iron Horse," depicting the main events of the B. & O. centenary; and Lieutenant-Commander Charles E. Rosendahl, U.S.N., commanding officer of the airship *Los Angeles*, who will describe with motion pictures the landing of the *Los Angeles* on the deck of the U.S.S. *Saratoga*, and also tell about his recent trip to Panama.

Detroit Selected by Central Accountants

MEMBERS of the Central Electric Railway Accountants Association have decided to hold the next meeting in Detroit on July 27 and 28, according to an announcement from Secretary L. E. Earlywine.

World Engineering Congress at Tokio in 1929

PRELIMINARY announcement has been made through the United States Department of State of a World Engineering Congress to be held in Tokio, Japan, for two weeks toward the end of October, 1929. The congress will be held under the auspices of the Kogakkai (Engineering Society of Japan), of which Baron K. Furuichi is president. An American committee has been organized, with Hon. Herbert Hoover, Secretary of Commerce, as honorary chairman, Elmer A. Sperry, active chairman, and Maurice Holland secretary. The committee members are engineers who are nationally prominent.

The congress proposes to discuss various engineering subjects in anticipation eventually to initiate and promote international co-operation in the study of engineering science and problems in all its branches and to cultivate a feeling of brotherhood among engineers of the world.

Joint Interests of Utilities Emphasized at Springfield Meeting

Major speeches at joint sessions of Illinois Electric, Gas and Electric Railway Associations last week in Springfield, Ill., show that interests common to all utilities are increasing

NEEDED for a greater measure of co-operation between all utilities in furthering their common interests and promoting better service to their customers, the evils inherent in government ownership of business, the opportunity offered the public service company to assume an active, helpful part in community affairs as a good citizen, and an explanation of the construction and functioning of terminable permits constitute the outstanding features of the joint sessions of the Illinois Electric, Gas, and Electric Railway Associations which assembled in Springfield, Illinois, March 14, for a two-day convention. Approximately 100 delegates listened to messages from such authorities in their respective fields as R. P. Stevens, president of the American Electric Railway Association, Oscar H. Fogg, president of the American Gas Association, Henry Swift Ives, vice-president of the Casualty Information Clearing House, Chicago; Charles N. Wheeler, assistant to the president Illinois Power & Light Corporation, and E. R. Dillavou, assistant professor of business law and economics, University of Illinois. A report of the first day's sessions appeared in this paper, issue of March 17, page 478.

Thursday morning's joint session of the three associations was featured by the address of Professor E. R. Dillavou of the University of Illinois on the subject of the terminable permit. Pointing out that there was nothing novel or complicated about a terminable permit, Professor Dillavou defined one as a franchise which continues indefinitely unless the utility is purchased by the municipality, or unless the permit is cancelled because of misconduct on the part of the company. Continuing, he said, "Such a permit seems to remedy the evils of the short term franchise and at the same time protects the public interest, particularly since public utility operation is subject to regulation by a state commission. The investor, having faith in the behavior of the management, and realizing that his money will be repaid if the city sees fit to terminate the permit, is ready to supply funds from time to time as the progress of the business demands."

Commenting on the unwillingness of municipalities to surrender control over the local utilities and where possible continue to impose onerous conditions on them in favor of the municipality, Professor Dillavou outlined the four possible solutions of this problem which have been suggested by the laws of terminable permit states. He detailed

that "the laws of Louisiana, which limit the use of such permits to the city of New Orleans, allow the municipality to insert any conditions which may be agreed upon at the time the permit is issued. Oklahoma provides that all new franchises must be for a

definite term, but they may be surrendered at the option of the utility for terminable permits which embody the terms of the surrendered franchise. Massachusetts has a law which makes it possible for many of the utilities to have all duties commuted into an annual money payment. Wisconsin is illustrative of a group, the law of which reads that the permit shall be "held under all the terms and limitations of this act." Professor Dillavou added that in this latter instance the courts have construed the law to mean that each permit is to be like every other permit, the consequence being that all burdensome provisions are eliminated and no new ones may be added.

COMING MEETINGS OF

Electric Railway and Allied Associations

March 30—Executive Committee American Electric Railway Association, 292 Madison Avenue, New York, N. Y.

April 6—Metropolitan Section, A.E.R.A., 39 W. 39th Street, New York, N. Y.

April 25-27—American Welding Society, annual meeting, 33 West 39th Street, New York, N. Y.

April 26-28—Missouri Association of Public Utilities, Jefferson City, Mo.

May 2-5—Southwestern Public Service Association, Dallas, Texas.

May 6-12—Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome, Italy.

May 9-10—Central Electric Railway Master Mechanics' Association, Erie, Pa.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 20-27—American Railway Association, Div. 5—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association), annual convention and exhibit, Atlantic City, N. J.

June 21-22—American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

July 27-28—Central Electric Railway Accountants' Association, Detroit, Mich.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

FAST SCHEDULES RESULT OF TRAINING

In his paper on the advantages of fast schedules, presented at the afternoon electric railway session, E. J. McIlraith, staff engineer Chicago Surface Lines, urged that a company need not wait to secure new equipment, or to widen the car doors, or to change the motors, or in fact undertake any other major and expensive alteration in order to improve operating conditions. "Usually," according to Mr. McIlraith, "remarkable improvement in speed may be obtained with no other change than training and supervision of the operating force. This means training of the entire organization from the manager down, so as to have each one working actively to discover ways and means of eliminating waste of time, and carelessness in the operation." An abstract of Mr. McIlraith's paper will appear in an early issue.

The subject of noise reduction and car heating was treated in a paper presented by H. H. Adams, superintendent of shops and equipment, Chicago Surface Lines. Concluding a summary of improvements in car equipment in which the substitution of aluminum alloys for heavier metals was discussed, Mr. Adams opined that while these improvements have all had their individual effects, collectively they have exerted an equally important influence on the problem of noise reduction. "Reduction of unsprung weight, gears that run in an oil bath, the elimination of the usual brake rigging and insulation from vibration," Mr. Adams added, "are all important factors in securing quiet operation."

F. L. Reardon, assistant treasurer, East St. Louis & Suburban Railway, in outlining certain short cuts in accounting practices with special reference to motor coach accounting, described in some detail the mechanical handling of fares, the savings which had accrued from the use of ticket issuing cash registers, and the methods employed in supplying itemized pay cards to the trainmen, and bus employees.

R. F. Palmblade, division manager Illinois Power & Light Corporation, Peoria, was elected president of the Illinois Electric Railways Association for the ensuing year.

News of the Industry

Relief Measure Voted Down in St. Paul

For the third time the voters of St. Paul, Minn., on March 13, turned down an enabling act amendment to authorize the Council to grant the St. Paul City Railway relief from certain costs which would have brought the return on the company valuation nearer to the 7½ per cent figure fixed by the Minnesota Railroad and Warehouse Commission as reasonable. It is expected the railway will now press a hearing before the commission on its application for an increased fare over its present 8-cent cash rate.

At two previous elections the proposed amendment was not put strongly before the voters, but the rejection on March 13 was in the face of a determined agitation by citizens to prevent a higher rate of fare in St. Paul than in Minneapolis. The relief intended to be afforded covered paving between tracks, cleaning, sprinkling and snow removal, etc. The saving to the company was estimated at \$200,000 a year. On the other hand, it was estimated by the committee that an increase of 1 cent in the fare will cost the patrons of the cars \$638,000 a year.

The net return at present to the St. Paul City Railway is estimated at 4.75 per cent as against 6.1 per cent in Minneapolis with the same rate of fare.

To pass the amendment needed 60 per cent of the vote cast at the election. The final figures were 28,077 to 29,836.

Franchise Suggestions Sought from Jacksonville Company

After lengthy discussion as to the factors that should enter into a franchise for the Jacksonville Traction Company, Jacksonville, Fla., the City Council voted unanimously to invite Peter O. Knight, Tampa, general counsel for the Stone & Webster interests in Florida, to prepare drafts of a franchise that would be acceptable by the company for comparison with the proposed franchise drawn by the local citizens' committee. Mr. Knight maintained that several of the provisions of the franchise draft that has been advanced for acceptance were restrictive and illegal. He said all that the Jacksonville Traction Company wants is "the right to live, a fair valuation set and a fair return on the investment."

Mr. Knight stated that Jacksonville alone presented opposition to his terminable permit bill in the last legislature and he distributed copies of a letter explaining the measure to every councilman. The letter states that the bill aims to eliminate the 30-year period of limitations for the granting of franchises by

municipalities and would give the municipalities the right to acquire the property of a utility at the termination of a franchise.

The simplicity of the franchise under which the Tampa Electric Company is operating was stressed by Mr. Knight. It allows the company to operate for 99 years and exempts the concern from payment of corporation or franchise tax on equipment. This agreement has proved satisfactory to the people of Tampa, he said.

Paving Bill Lost in New York

Admitting that he could not muster the votes in his senate public-service committee to report his bill to relieve electric railways in New York State of a substantial portion of their present paving obligation, Senator Warren T. Thayer, father of the so-called compromise proposal, indicated on March 18 that he had abandoned all hope for the legislation. The Thayer bill was the result of conferences between representatives of the cities of the state and spokesmen for the organized railway interests.

The companion bill by Assemblyman D. Mallory Stephens of Putnam County now lies in rules committee of the lower house, where it bids fair to remain.

Appreciation of Toronto Service

THERE can be no doubt that D. W. Harvey, general manager of the Toronto Transportation Commission, and those associated with him have given to Toronto one of the finest street car services in the world. . . . Most of the complaints today arise from overcrowding in cars during rush hours. The remedy for this lies more with employers of labor than with the Transportation Commission. If office hours were "staggered," as has been suggested, much of the congestion on the street cars would be eliminated. It needs to be remembered by those who complain that the "rush-hour" problem is not peculiar to Toronto. It has taxed the best brains of transportation experts in every city, and has never yet been adequately solved. That the system under Mr. Harvey's management is giving an infinitely superior service to that in the majority of other cities there can be no doubt. With one or two difficulties ironed out, it will rank with the best in the world.—*Toronto Globe*.

Old Matters in Toledo Must Be Cleared Up

Mayor W. T. Jackson of Toledo, Ohio, recently insisted that all "unfinished matters" in connection with the Community Traction Company situation be cleared up under the Milner ordinance before there is talk of a new plan of operation. Company officials have agreed to this.

The power rate is one matter that has never been agreed upon definitely due largely to the fact that it is a contract between the Community Traction Company, and the Toledo Edison Company, identical in ownership and control to all practical purposes. Court action was tried at one time but the courts held that the Public Utilities Commission of Ohio alone had jurisdiction and no conclusion has ever been reached before that body. Whatever settlement is reached on power will be retroactive to July, 1924.

Another matter to be cleared up is the paving obligation of \$187,500 with interest which was acknowledged due the city when the ordinance was adopted and accepted.

The Mayor has indicated that with these two matters arranged some new plan may be worked out which will give the company substantially what it desires—regulation of independent bus operation so that it may co-ordinate public transit in Toledo and put the financial structure of the company on a sound basis. Company officials contend that no change can be made in the valuation agreed upon at the time the Milner ordinance was adopted.

City representatives believe that the management should bring in new capital to bolster up the property and restore the value back of securities outstanding. A plan of this kind was tentatively agreed upon in the basis of agreement reached last summer before the so-called Dotson ordinance was drawn. That effort has now been laid aside apparently because it did not meet the ideas of the board of control.

Framing Wage Demands in Scranton

Employees of the Scranton Railway, Scranton, Pa., voted recently to ask for an increase of approximately 5 cents an hour and modification of several clauses in the present working agreement. The present one-year agreement expires on March 31. Last April the men were granted an increase of 1 cent an hour in all departments. This provided for a scale in cents per hour as follows: first three months, 57; next nine months, 62; after one year, 65, with an 8-cent differential for one-man operation.

Suit in Madison Settled

The suit in the Superior Court against the officers of the Madison Railways, Madison, Wis., has been settled by the payment of a fine. This suit arose out of an item of \$73,000 which F. W. Montgomery, president, loaned to the company and subsequently forgave in 1921. In 1924 the board of directors by a resolution, immediately typewritten in the minute book of the company where it was open to inspection by the auditors of the Railroad Commission, offered to repay this amount as and when Mr. Montgomery might ask for it. This resolution was not regarded as creating an obligation of the company in the sense that it should be entered on the account books. Payments were made in 1925 and 1926, and these payments were duly entered on the account books of the company and reported to the Railroad Commission. An official statement says:

There was no attempt at concealment of the action of the board of directors, and no attempt to mislead anybody. Everything was open and aboveboard. The failure to report the item was at most a technical violation, and even that is subject to a difference of opinion.

The litigation in the Superior Court was, however, affecting the credit of the company, and the associates of F. W. Montgomery on the board of directors, and other friends, felt that the preferred stockholders and other investors in the securities of the company might suffer damage and loss unless this litigation was settled at once. For this reason alone the suits were settled and the fine paid.

During all of the time that the present management has had control of the Madison Railways it has been honestly and efficiently conducted. The credit of street railways has not been good for many years, and F. W. Montgomery has had to produce most of the money needed by the company. He has carried the burden. The city has received better railway service than any other city of its size in the United States. We shall continue to render this service in the knowledge that we have done no intentional wrong.

Short Extension of Eastern District Subway

The Transit Commission has informed the New York Rapid Transit Corporation (B.-M.T.) by letter that it had determined upon an extension of the Fourteenth Street-Eastern District Subway from its present terminus in Manhattan to a point between Eighth and Ninth Avenues, Manhattan, where a connection may be made for exchange of passengers with the existing Seventh Avenue subway, and with the Eighth Avenue subway now being constructed.

The extension will constitute a two-track underground railroad, beginning at a point in West Fourteenth Street, Manhattan, between Sixth and Seventh Avenues, where a connection can be made with the Fourteenth Street-Eastern line now in operation, and extending thence westerly under and along

West Fourteenth Street to a point therein between Eighth and Ninth Avenues, including a station, to be centered approximately at Eighth Avenue. The extension is a very short one, not more than several blocks, but it would be of inestimable benefit in providing access to the transit lines on the west side.

W. S. Menden, president, in a letter to the commission on June 23, 1926, indicated that the railroad would acquiesce in the extension.

Homer Loring Helps Employees

Homer Loring, chairman of the board of the Boston & Maine Railroad, accepted no compensation from the Boston & Maine Railroad during the four years in which he directed the work of the road's rehabilitation. In accepting his resignation recently the board of directors voted him \$100,000, which Mr. Loring has accepted only in order to establish a fund, "to be administered by trustees for the general good of all employees of the Boston & Maine."

Mr. Loring is best known to electric railway men as the former chairman of the trustees of the Eastern Massachusetts Street Railway. As a restorer and re-organizer of faltering enterprises Mr. Loring has had many conspicuous successes. He brought the Des Moines, Fort Dodge & Southern Railroad back to solvency and did some notable work in the revival of the Saginaw Traction Company in Michigan.

Trial of Higher Fare on Ohio Line

The right to charge a 10-cent fare between Dover and New Philadelphia beginning April 11 has been granted the Northern Ohio Power & Light Company. This rate of fare authorized by the City Council of Dover, Ohio, is to continue until the expiration of the company's franchise between the two towns Nov. 9, 1928. The change is made to enable the company to determine whether the increase would justify the company's continuing service between the two towns after that date. Heretofore the fare has been 5 cents between the cities. The company formerly had two lines operating between Dover and New Philadelphia. One of the lines was abandoned several months ago and bus service installed.

Wage Conferences in St. Louis

Conferences are being held by the Amalgamated Association at St. Louis, Mo., on the wage demands of the 4,500 union employees of the St. Louis Public Service Company. The union has asked for a sixteen-months contract and an increase of 5 cents an hour for the 3,500 motormen and conductors and increases of from 5 to 10 cents an hour for shopmen, mechanics and maintenance-of-way workers.

Would Sell Three Tokens in Omaha

The Omaha & Council Bluffs Street Railway, Omaha, Neb., has asked the Nebraska Railway Commission for authority to sell three tokens for 20 cents. The present requirement is that no smaller number than six tokens may be sold, and the commission fixed the rate at 40 cents. This is the equivalent of three tokens for 20 cents. However, the commission's finding, made two years ago, stated that the company needed every cent of revenue possible, and that to offer three tokens for 20 cents would result in a large decrease in the cash fares. Patrons are understood to have suggested that more persons would ride if they could invest only 20 cents at a time.

Increase on Warren & Jamestown

The Public Service Commission on March 19 authorized the Warren & Jamestown Street Railway, operating between Jamestown and Warren, Pa., to file a new schedule effective on one day's notice, increasing its mileage rate in New York from 2½ to 3 cents a mile and providing for fourteen zones, instead of eleven, with a fare rate of 5 cents in each zone. Seven of the fourteen zones are in New York State and the remaining seven in Pennsylvania. A single ticket-book rate of 56 coupons for \$2.50 good for use by a purchaser and the members of his family without time limit and certain special one-way tickets and school commutation ticket rates have been authorized.

Present fares are based on a rate of 2½ cents a mile. The company asked the right to establish a basic rate of 3 cents. There are now eleven 5-cent fare zones covering the 22-mile distance between Jamestown and Warren which it asked permission to increase to fourteen.

Evidence submitted before the commission showed a decline in operating revenues during the past six years. Commissioner Pooley in a memorandum says the revenues of the company have steadily declined since the construction of the Jamestown-Warren highway. There were 753,505 passengers carried in 1920 and 419,987 in 1927. The revenue from passengers dropped from \$150,701 in 1920 to \$87,112 in 1927, or approximately 40 per cent. Freight revenues declined from \$23,693 in 1920 to \$4,529 in 1927.

The evidence showed that under the proposed new rates, and based on no further decline in traffic, there will be approximately a 20 per cent increase in passenger revenue. The commission further found that under the new rates and provided the company carried the same number of passengers in 1928 that it did in 1927, there would be an estimated increased operating income of \$25,146, or a return of about 5 per cent on about \$500,000 invested in giving service.

Senate Fails to Reappoint J. J. Esch

John J. Esch of Wisconsin, who had served on the Interstate Commerce Commission for six years prior to his renomination by President Coolidge last December, lost his fight for confirmation on March 16 when the Senate, after five hours of debate behind closed doors, rejected the appointment by 39 to 29.

The opposition was led by Senators from the Southern coal states. It was based almost entirely on the commissioner's change of attitude in the long pending contest between the mines of Pennsylvania and Ohio and those of West Virginia, Kentucky, Tennessee and Virginia, for the lake cargo trade.

The commission recently rejected a petition of Southern railroads for a reduction of 20 cents a ton in lake cargo coal transportation charges.

After the executive session Senator Neely, Democrat, West Virginia, said the vote "is a very emphatic warning that the Senate will not tolerate the packing of these important commissions by President Coolidge in favor of Pennsylvania or any other section or in favor of any particular interests of the country."

In a minority report from the Interstate Commerce Committee Senator Fess declared that from the standpoint of ability and experience Mr. Esch was "eminently fitted for the position and from the basis of honesty and integrity he is equal to the best in public life."

The minority report called attention that in between his two votes Mr. Esch, like all other members of the commission, had the benefit of "extended further hearings, a mass of further evidence which embraced some 2,000 pages, and two days of oral argument before the full commission."

Fare Hearing in New York Postponed

Because of the illness of Samuel Untermeyer, special counsel for the New York Transit Commission, the sitting of the federal statutory court, scheduled for March 22 to hear further argument on the application of the Interborough Rapid Transit Company for a 7-cent fare was postponed on March 21 to March 29. The city's argument will then be presented by former Controller Charles L. Craig. George L. Ransom, special counsel for the Interborough, will make a reply argument.

Both Mr. Untermeyer and Mr. Craig have declared that there is no conflict between them regarding the policy to be pursued in combating the Interborough's increased fare suit. It was pointed out that Mr. Untermeyer had upheld from the outset the validity of the 5-cent fare contract between the city and the Interborough and that Mr. Craig was merely concentrating upon that phase of the entire case.

The intricate questions of valuation and fair return upon capital invested, it was indicated, would be handled by Mr. Untermeyer.

Franchise Talk in Kansas City, Kan.

Tentative plans of the City Commission of Kansas City, Kan., for the creation of a board of control to have jurisdiction over all transportation have virtually been abandoned following discouraging investigations of the cost of engaging technical experts as advisors.

It was suggested at the recent meeting of the City Commission that the body wait until the Wyandotte Railway requests a franchise as a solution to the problem of satisfying riders. The franchise of the predecessor company expired in 1922.

Interchanging System Between Illinois and Indiana

The Illinois Traction System is considering plans for a hook-up of its lines with the Terre Haute, Indianapolis & Eastern interurban lines between Danville, Ill., and Crawfordsville, Ind., utilizing either electric lines or buses. While the connecting link is intended primarily for convenience of shippers the line will be available to passenger traffic and give Illinois and Indiana an interchanging freight and passenger system.

Safety Rewarded at Little Rock

Twenty-five of the 110 operators regularly employed in the railway service of the Arkansas Power & Light Company at Little Rock, Ark., completed 1927 without a chargeable accident. This was announced at a recent safety meeting at which cash prizes were distributed to the successful competitors in the accident prevention campaign. Thirty-three men participated in the prize money.

The first team of eleven operators received \$150. The second received \$100, and the third \$50. Seven teams failed to place.

The system of prizes, which was used last year as an experiment, is not being followed this year. In 1927 the men were grouped into teams in the accident prevention work, and the team worked as a unit. The purpose of this was to stimulate co-operation and emulation in accident prevention records. For this year the plan specified an advisory council consisting of various department heads.

Car on Exhibition in Macon

Residents of Macon, Ga., were invited in a newspaper advertisement to inspect the first of twelve new cars for the Macon Railway & Light Company on March 4 and meet a representative on duty to explain the safety devices.

Right of Hartford Under Tucker Grant Upheld

Chief Justice George W. Wheeler in the Supreme Court at Hartford, Conn., has handed down a decision against the Connecticut Company and upheld the city of Hartford and its right to collect 2 per cent of the gross fares paid to the railway within the city limits, as established by the Tucker Grant in 1894 through an agreement between the Connecticut Company and the city. This was for the privilege of electrifying and extending its railway lines in Hartford.

The Connecticut Company paid the tax from 1894 until 1922. It is not expected the company will appeal to the United States Supreme Court as no constitutional question is involved.

In the lower court last year Judge Jennings held the tax of 2 per cent was illegal. The Supreme Court in answer to this says:

The payment provided for was not a charge levied by government upon the Connecticut Company's property for governmental purposes, but its payment of an obligation created by its voluntary action. The provision for payment of a percentage of the gross receipts does not fall within any known definition of a tax; it is neither proportional nor compulsory in character, but voluntary and individual, and its very attribute is antagonistic to the normal attributes of a tax.

The tax originated in 1893 when the Connecticut Company's predecessors sought to electrify and extend the Hartford lines. In 1894 the Tucker grant extended the right to the company with the understanding 2 per cent of the gross fares would be paid into the city treasury yearly. The railway agreed to the plan.

The Supreme Court in reviewing the case found that the city had the right to make such an agreement under its charter, and that the Connecticut Company could not by its long payment of the tax, challenge the validity of that agreement. The court also said the Connecticut Company could not have extended its lines without the consent of the Common Council at that time. The agreement then was made so that it could. The court said:

The payment provided for was not a charge levied by government upon the company's property for government purposes, but the payment of an obligation created by its voluntary action.

Power Contracts to Boston Edison

Charles L. Edgar, president of the Edison Company, Boston, Mass., says that since the close of the fiscal year, contracts have been entered into with the Boston & Maine Railroad for its entire electric service and steam heating requirements for a long term of years, and for about 75 per cent of the electricity needed for the Boston, Revere Beach & Lynn Railroad, now being equipped for electric operation under plans outlined previously in these pages.

\$10,000 in Prizes Offered for Traffic Solutions

With the view of determining the best means of solving the constantly growing traffic problem, *Nation's Traffic*, a monthly publication issued in St. Louis and devoted to street and highway traffic, is conducting a contest in which a \$10,000 is offered for ideas on the subject.

How to divert traffic into its most useful channels as well as how to administer properly the various functions of traffic control are among the purposes of the nation-wide quest for ideas. Fifteen cash awards are offered. First prize will be \$2,500 and second \$1,500. The next three will be awards of \$1,000 each, with the sixth prize of \$750 and the other nine ranging in amounts from \$100 to \$500.

The subjects are as follows: Text for uniform traffic ordinance, plan for regulating movement of traffic with signals and signs, plan for the solution of municipal parking problems, typical city plan to better traffic conditions, curriculum for adult education, plan for handling traffic violators, plan for regulation of pedestrians, curriculum for juvenile education, plan for reducing railroad crossing hazards, plan for traffic police organization, street lighting plan to aid traffic, plan for motor vehicle registration and identification, and plan for handling tourists.

There is to be a bonus of \$100 for the neatest and most carefully prepared manuscript and another of the same amount for the most helpful suggestion or idea.

Another Boston "L" Program of Legislation

The death-knell of Governor Fuller's program for the extension of public control of the Boston Elevated Railway has been sounded on Beacon Hill. All possibility of the return of the road to private operation also seems to have vanished. There apparently remains now only the public ownership legislation, or a policy of letting the entire problem go over for another year.

In this connection the defection of Charles C. Warren of Arlington, up to his time foremost exponent of extending public control to the camp of those advocating public ownership, is regarded as significant. He first tried unsuccessfully to have a resolve recommended which would provide for the appointment of a special legislative committee by the governor, consisting of the president of the Senate and two Senators and the speaker of the House and four representatives, to prepare a public ownership bill.

Senator Warren then declared that after four years of constant effort to provide for an extension of public control he was convinced that no such bill could ever be passed which would be accepted by the stockholders. He said he opposed a return of the road to private ownership as the State would be giving up its option right of the 1918

public control act, which was of tremendous value to the district and to the state.

After considerable discussion a motion was made that the two committees, acting jointly, vote to report the public ownership bill.

Southern Ohio Company Granted Franchise

A fifteen-year franchise has been granted the Southern Ohio Public Service Company, Zanesville, Ohio, through the village of Bexley, Ohio. The company is permitted to abandon its Mound Street tracks through Columbus.

Provisions of the franchise include a 10-cent fare into Columbus from Bexley. The company is to use the same tracks as the Columbus Railway, Power & Light Company as far as Drexel Avenue, where it will continue to Pleasant Ridge Avenue and from there use its own tracks. Bexley is just outside the eastern boundary of Columbus.

Franchise Sought for Improvements in East St. Louis

The East St. Louis Railway is seeking a franchise to take over part of the tracks of the East St. Louis & Suburban Railway so that it may be able to co-operate in the construction of a subway to carry State Street under the tracks of the Terminal Railroad belt line at 21st Street in East St. Louis, Ill. The tracks of the East St. Louis Railway now end on State Street near Nineteenth Street. The franchise from that point eastward is held by the East St. Louis & Suburban Company.

If the bill, presented to the East St. Louis City Council, is passed it must be submitted to the people for ratification at the general city elections to be held on April 3. Convenience and safety to patrons are the considerations in this project.

The East St. Louis City Council is also considering a proposed franchise for the East St. Louis, Columbia & Waterloo Railroad to build new tracks in order to enter East St. Louis by a circuitous route instead of coming direct down Broadway on the tracks divisions of the East St. Louis Railway used by the Broadway and Alta Site Company. If passed this bill will also go to a vote of the people on April 3.

A Radio Treat by Railway Men

THE Cleveland Railway chorus and the Pittsburgh Railways' band will broadcast over KDKA Saturday night, March 31, at 10 o'clock p.m. There are 150 in the chorus and 50 men in the band. The arrangements were made by the Westinghouse Electric & Manufacturing Company.

Transit Legislation for New York City Defeated

As the special correspondent of the *New York World* at Albany expressed the matter in a dispatch to that paper dated March 22, the 151st session of the New York State Legislature performed that day what many people consider the most notable act of its career. It adjourned sine die at 5:56. In a session in which many bills went down there was defeat for all New York City transit legislation, except two bills sponsored by Assemblyman Moran, under which it is hoped to add somewhat to the speed of subway construction by making more prompt payment for property which may be condemned.

The manner in which some of these measures was handled had all the aspects of a political gesture. Thus Minority Leader Maurice Bloch made a motion on March 22 to discharge the rules committee from consideration of the transit bill to enable the city of New York to acquire and unite into one system all rapid transit lines in the greater city. The motion was defeated. This bill, presumably prepared by Samuel Untermyer, was not introduced until a very late date, almost on the eve of adjournment. It has never been supported by any statement from Mayor Walker of New York asking for its passage. In the Senate the bill was amended on March 19 to take care of a few technical errors which could have been corrected by the committee on revision.

The bill provided for a 5-cent fare so long as the city of New York wished to make up by appropriation any operating deficit that might ensue from management by a board which would be practically the city government of New York. In reality the measure would have allowed the city of New York to go into the rapid transit business.

Employees Charged With Neglect in Key System Accident

Two Key System Transit Company employees, Edward Dyson, chief engineer, and Harry E. Hill, both of the ferryboat Peralta, have been cited for neglect by steamboat inspectors who conducted an inquiry into the accident of Feb. 17 when the bow of the craft suddenly dipped and spilled 30 passengers into San Francisco Bay. Five were drowned. The two accused men face trial on March 28 before the steamboat inspection board. No criminal action is implied in the citation, but the two men will lose their licenses if found guilty.

The specific charge is that the two officers failed to notify Capt. W. H. Melsome of the Peralta that the forward ballast tank was filled at the time of the accident. Both men told inquisitors at the hearing that the tank was not filled. They deny the negligence charges.

The company's suggestion that the accident was caused by an uncharted declivity in the bottom of the bay has been discounted by soundings, United States investigators declare.

Recent Bus Developments

Buses Proposed for Use in Alameda

William J. Locke, City Attorney of Alameda, Cal., has announced that the Key System has notified Alameda that it has no intention of putting tracks through the tube or repaving its right-of-way along Webster Street. The company also, according to Mr. Locke, will apply within the next few days to the Railroad Commission to abandon its railway franchises in Alameda. Alameda county officials said recently that it is understood the Key System intends to substitute bus lines for its Alameda railway.

At a straw vote held early in February the citizens of Alameda registered their desire in favor of the railway system. A representative of the railway said the company has not filed an application with the state commission and that officials are not ready to make a statement.

Federal Court Has Jurisdiction in Muncie Case

A mandate from the circuit court of appeals at Chicago has been handed to the clerk of the federal court in Indianapolis reversing the decision of Judge Robert C. Baltzell in a suit of the Equitable Trust Company of New York, which sought to enjoin Sumner Denny and others from operating bus lines in Muncie, Ind. Judge Baltzell, who first heard the case, decided the federal court had no jurisdiction.

The complaint set out that the trust company held a mortgage as security for \$5,000,000 in bonds issued to the Union Traction Company of Indiana in 1899. This mortgage, the plaintiff said, established the right of the trust company to jurisdiction over railway company franchises for bus operation in Muncie. The suit alleged that the defendants in establishing a competitive line in Muncie failed to obtain a certificate from the Indiana Public Service Commission. According to the circuit court decision the Indianapolis federal court has the right to hear the case.

Detroit-Pittsburgh Bus Permit Sought

Application has been made to the Ohio Public Utilities Commission for permission to establish the first interstate bus line from Detroit, through Toledo and Akron, to Pittsburgh by the Northern Interstate Transit Company, a subsidiary of the Northern Ohio Power & Light Company. Hearing on the petition has been set for April 5. The new bus line as proposed would make three trips daily each way between Detroit and Pittsburgh and

would offer fare at rates below railroad transportation between those points. The proposed running time between Detroit and Pittsburgh is eleven hours and the proposed route extends from Detroit through Toledo, Elmore, Fremont, Norwalk, Medina, Akron, Alliance, Salem and East Liverpool to Pittsburgh. It is planned to use six coaches each carrying 24 passengers. Permission has been secured in Michigan to get out of Detroit to Toledo. Permission has also been secured for entrance into Pittsburgh. All that remains is authority from the Ohio commission and apparently there is no objection to this.

Extension of Bus Line in Los Angeles

The Los Angeles Railway has been authorized by the California Railroad Commission to extend its Melrose Avenue bus line in Los Angeles County from the intersection of Melrose and Western Avenues to the highway known as La Cienega Boulevard.

Bus Service Increased Following Ohio Abandonment

The Ohio Public Utilities Commission has granted the Northern Ohio Power & Light Company permission to discontinue interurban passenger service between Canton and Akron and to abandon its tracks between Canton and North Canton. Freight service between North Canton and Akron and passenger service between Akron and Springfield Lake will be continued. Bus service between Akron and Canton supplied by the Cleveland-Akron-Canton Bus Company, a subsidiary of Northern Ohio Power & Light Company, which has been operating for several years, will be increased. The commission's permit is to take effect not later than May 1, 1928. The line was built a little more than a quarter of a century ago. During all that period the company has maintained hourly schedules between the two cities.

Freight from Canton will be routed over the Stark Electric to Alliance which it will be switched to the Northern Ohio tracks and taken into Akron via Ravenna. Passengers will be transported from Canton to Akron by bus.

To handle the increased business, the Stark Electric plans to close its substation at Louisville, between Alliance and Canton, and have two substations one just east of Canton and one just west of Alliance. Traffic between Canton and Louisville, a distance of 5 miles, will require twice the number of interurban passenger cars. Extra track is being laid to accommodate the additional carriers.

Opposition to South Bend Feeder Bus Project

The recent application of the Chicago, South Bend & Northern Indiana Railway for a permit to operate feeder bus service in west South Bend, mentioned in the *ELECTRIC RAILWAY JOURNAL* previously, was opposed in a petition filed with the Indiana Public Service Commission by the South Bend Motor Bus Company. In the intervening petition the commission was asked to dismiss a petition filed by R. R. Smith, receiver for the railroad, on the ground that the commission has no legal authority to nullify an agreement with the South Bend board of public works, which allows the South Bend Motor Bus Company to operate in this section of the city.

Buses Withdrawn from Woodward Avenue, Detroit

Motor coach service on Woodward Avenue, Detroit, was ordered abandoned by the Detroit Street Railway Commission at a meeting in Mayor John Lodge's office on March 7. This action was taken as a result of the failure to make money and the monthly increasing deficit from its operation.

Del A. Smith, general manager of the system, stated that he would immediately place additional street cars in service to take care of the traffic previously handled by the buses. The number of cars operating to all points on Woodward Avenue will be increased. More cars are to run to the carhouse at the Ford factory, to the Palmer Park run and to the Fair Grounds run, all on the Woodward line.

Woodward Avenue is one of the main thoroughfares over which jitneys are operating in competition with the municipal transportation system. The buses released from this service will enable the department to extend its lines in other sections of the city.

Substitution in Indiana

On petition of William A. Carson, receiver for the Evansville & Ohio Valley Railway, operating electric railway lines from Evansville, Ind., to Henderson, Ky., Mt. Vernon and Grandview, Ind., Judge Elmer Q. Lockyear, of the Vanderburgh County Probate Court at Evansville, on March 16 ordered the suspension of service between Evansville and Henderson and the substitution of bus service by the company. The receiver filed a petition, setting out that suspension of the railway service between Evansville and Henderson was to the best interests of the company and the creditors because the company was losing money daily on the Henderson line.

The court granted the petition and authorized the receiver to borrow \$21,000 for the purchase of three buses.

Mr. Carson said the bus route would be through Howell, down the Henderson public highway on the Indiana

side of the Ohio River to the ferry at the Louisville & Nashville Railroad bridge and across the river. Fares and schedules will be the same as on the railway lines.

The Henderson line of the Evansville & Ohio Valley Railway at present uses a transfer boat on the Ohio River 6 miles above Evansville to take its cars across the Ohio River.

Some time ago the Evansville & Ohio Valley Railway petitioned the Indiana Public Service Commission to permit it to use buses on the Evansville-Mt. Vernon line of the company and this change is expected to be made in the near future.

Priority Rights Questioned in Los Angeles

A petition for re-hearing of the commission's recent order granting the Pickwick Stages System a permit to operate its service between Los Angeles and Venice was filed by the Pacific Electric Railway Los Angeles, Cal., with the California Railroad Commission on March 13. The Pacific Electric protests the finding of the commission that it is not financially so well able to maintain the bus service as is the Pickwick Company, denies that Pickwick is better qualified by experience to operate the line, and contests the priority of the application upon which the permit was granted.

The United Stages, Inc., filed the original application in the matter and subsequently withdrew in favor of the Pickwick Stages. The withdrawal is cited by the Pacific Electric as a reason why its application has priority over that of Pickwick.

Bus Authorization in Massachusetts

The Massachusetts Public Utilities Commission has authorized the Point Shirley Street Railway to operate a bus line in the city of Winthrop, Mass. As planned, the line will run between the Winthrop Beach Station and Point Shirley. The commission has also authorized the railway to acquire, own and operate buses for the transportation of passengers.

Needed Bus Line in St. Louis Under Consideration

The St. Louis Public Service Company is making a survey to determine whether a bus line should be established between Jefferson barracks and Koch Hospital, the St. Louis, Mo., tuberculosis sanatorium south of the barracks. Arthur Stoehr, secretary of the St. Louis bond issue supervisory committee, pointed out to the railway officials that the tuberculosis sanatorium had hundreds of visitors weekly and that the only conveyance was a private bus which was furnishing unsatisfactory service.

Financial and Corporate

New Board for West Chester Street Railway

At the annual meeting of the West Chester Street Railway, West Chester, Pa., the following were elected directors for the ensuing year: Eric H. Biddle, John T. Collins, Jr., Franklin P. Jones, Lawrence J. Morris, Edmond W. Palmer, J. V. Pennegar and O. Howard Wolfe.

O. Howard Wolfe, cashier of the Philadelphia Girard National Bank, was elected president and Eric H. Biddle, formerly secretary and treasurer of the company, was elected vice-president and general manager. T. O. Roberts was elected assistant secretary and treasurer.

The West Chester Street Railway is undergoing a financial re-organization, a plan and agreement for the readjustment of the securities of the company having been issued by a security holders protective committee. Up to the present time a large part of all classes of the company's securities has been deposited under the plan and agreement.

\$4,400,000 Kansas City Public Service Issue Offered

Improvements to the properties of the Kansas City Public Service Company, Kansas City, Mo., will be partially financed with a portion of the proceeds of \$4,400,000 first mortgage 6 per cent bonds offered on March 21 by Halsey, Stuart & Company, Chase Securities Corporation and Newman, Saunders & Company. The bonds were priced at 95 and interest, yielding more than 6.40 per cent. They are dated July 1, 1926, and are due July 1, 1951.

It is explained that of these bonds, \$2,534,800 are new bonds, and the proceeds therefrom will be used for capital additions and improvements to the company's property. The balance of the bonds being offered have been previously issued and do not increase the company's funded debt or its interest charges.

The company, with a wholly owned subsidiary, owns and operates the entire railway system in Kansas City and Independence, Mo., and Kansas City, Kans., and a motor bus system in Kansas City, Mo.

Debt in Seattle Diminished

Seattle, Wash., now owes on its municipal railway purchase debt to the Puget Sound Power & Light Company \$436,296, not including interest. The debt was diminished \$172,966 on March 13 when City Comptroller Harry W. Carroll paid that amount as first installment, with interest included. The remainder will be paid in four equal

installments, annually. The payment was made in railway department warrants drawn on a fund that had been enlarged by loans of \$550,000 from the light department. Part of the loan was used some time ago to enable the railway to pay operating costs while it accrued funds sufficient to meet the bonded purchase debt installment.

The railway was assessed \$401,017 for 1919 by the county assessor but litigation costs and accrued interest have increased the total the railway must pay by nearly \$300,000. There was pending a long time in federal court a suit in which the city contested a contract with the Puget Sound company stipulating that the city was to pay three-fourths of the 1919 tax. The company won.

Liberalizing Savings Bank Investments in New York

Without opposition the Assembly of New York has passed and sent to the Governor two of the bills permitting wider latitude in savings banks investments. The first bill permits savings banks to purchase equipment bonds of railroads and the second legalizes investment in the bonds of electric, gas and telephone companies. The provision for investment in utility bonds and telephone issues under stipulated restrictions is made in two subdivisions added to section 239 of chapter 369 of the laws of 1914. Most important provisions in the law follow:

The company must be duly incorporated under laws of the United States for business of supplying electrical energy or gas, and at least 75 per cent of the gross operating revenues of such company must be derived from such business, not more than 15 per cent of such revenues being derived from any other one business; the company must operate under the duly established public service commission or other regulatory body; the company must have the necessary franchises for operation in territory from which 75 per cent of its gross income is derived.

The outstanding full paid capital stock shall be equal to at least two-thirds of the total debt secured by mortgage lien on any part or all of its property; such corporation must have been in successful operation for at least eight fiscal years and must have a satisfactory record for payment of debt service; for a period of five fiscal years earnings must have averaged not less than twice annual interest charges on funded debt; applicable to the period such bonds must be part of an issue of not less than \$1,000,000 and must be secured by either a first or a refunding mortgage secured by property owned and operated by the issuing corporation.

Not more than 10 per cent of the assets of any savings bank shall be invested in electric and gas bonds, and not more than 2 per cent of such assets shall be invested in bonds of any one such corporation.

The bill to amend the law on invest-

ments in bonds and obligations of railroad corporations recognizes the importance of earnings on capital stock, apart from whether such earnings have been paid out in dividends. In the old law it was provided investment might be made in bonds of railroads which, with other requirements, met the obligation that "at no time within five years next preceding the date of any such investment such railroad corporation shall have failed regularly and punctually to have paid in dividends to its stockholders during each of said five years an amount at least equal to 4 per cent upon all its outstanding capital stock."

The new law contains this provision, with the alternative that the road shall have earned net income of at least 4 per cent during each year of the five. Net income is defined to mean net income as set forth by the accounting regulations of the Interstate Commerce Commission.

Another departure is adding to the legal list bonds issued or assumed by a

terminal depot or tunnel corporation, provided they meet the requirements applied to other railroad bonds, and provided the bonds are guaranteed by endorsement, principal and interest, by one or more railroads meeting the provisions of the savings bank law.

Bonds secured by pledge of other railroad bonds as collateral under a trust agreement become legal provided the pledged bonds are themselves legal for such investment; do not mature earlier than the bonds so secured; are not less in par value than the amount of the bonds they secure, and that no substitution or withdrawal of collateral may be permitted.

Equipment trust obligations, maximum amount of which do not exceed 80 per cent of cost of rolling stock purchased, provided the latter is owned by or leased to a road, any of whose bonds are legal, or to a company controlled through majority stock ownership, or a subsidiary whose controlling company guarantees the equipment bonds, provided its own bonds are legal.

Lines' system at the end of the first year of unified operation (Jan. 31, 1915) and at the close of the fourteenth year (Jan. 31, 1928).

A total of \$113,741,583 has been paid for public benefits by the companies since the adoption of the 1907 ordinances, divided as follows: For clearing right of way, including sprinkling and removal of snow and ice, \$11,166,425; street paving, \$16,671,621; maintenance paving, \$6,578,339; general taxes, \$35,839,359 (year 1927 estimated); track and overhead removal and replacement on account of sewer installation, etc., \$1,890,744; city's 55 per cent proportion of net earnings, \$41,595,095.

A new world's record in service was made during the 1927 Christmas shopping season when every car and bus owned by the company was operated in peak load periods on Wednesday, Thursday and Friday, Dec. 21, 22 and 23. This is the second time 100 per cent operation has been attained on a large street car system and the previous record was made also by the Chicago Surface Lines on Dec. 20, 1926.

This use of all equipment in the Christmas peak saved the investment necessary for 200 additional cars, the number usually being overhauled. The cost for each car and car storage would average about \$20,000, making a total saved in capital investment of approximately \$4,000,000.

The report refers to the supplemental arbitration agreement entered into Dec. 12, under which an award was made on Jan. 21, signed by two new arbitrators following the agreement for arbitration signed July 18, 1927, under which no award was made because of the inability of the two arbitrators to select a third man.

This award covers the period from June 1, 1927, to May 31, 1930. It provides for life insurance effective Feb. 1, 1928, in the amount of \$1,000 and \$20 a week for sick and accident insurance—also a 1 cent per hour increase in wages starting June 1, 1928, and an additional 1 cent June 1, 1929. It also provides for the payment of \$35 to all members of Division 241 in service Feb. 1, 1928, who were in service prior to June 1, 1927, and \$12 to those in service Feb. 1, 1928, who went into service between June 1, 1927, and Nov. 1, 1927. The award was approved by the Hon. James H. Wilkerson, Judge, United States District Court, in accordance with the terms of the agreement under which the award was made. The board of operation authorized extension of the life insurance and sick and accident benefits to all other employees, effective Feb. 1, 1928.

Team work on the part of employees directed by the department of accident prevention was largely responsible for a reduction of 12.5 per cent in number of reported accidents. Fatal accidents were reduced more than 14 per cent.

The best record during any fiscal year since 1921 was made in number of car riders and car-miles per accident.

The second annual accident preven-

Increase in Revenue and Riding

Chicago Surface Lines report increase in gross and residue receipts in 1927. Total rides, including transfers, were 1,585,441,127, while revenue passengers totaled 882,458,647

THE Chicago Surface Lines, operating under temporary municipal permits during the fiscal year Feb. 1, 1927, to Jan. 31, 1928, made further progress in its record of service, traffic and earnings. Gross earnings were \$61,624,752, an increase of \$451,151 compared with the previous year. This total was the highest in the history of the companies. Operating expenses, including taxes and renewals, were \$48,231,496, an increase of \$360,006. Residue receipts were \$13,393,256, an increase of \$91,145. The city of Chicago's share of divisible receipts was \$2,500,225 and purchase price of the properties as of Feb. 1, 1928, was \$163,917,765. These facts were contained in the fourteenth annual report of the president of the board of operation.

Increase in traffic, which had been maintained for 24 consecutive months, was interrupted in June when there was a decrease, and like conditions prevailed during four later months of the year. Notwithstanding this, the total rides for the year reached 1,585,441,127, an increase of 10,471,225, while the revenue passengers totaled 882,458,647, an increase of 6,208,984 over the previous year. Service was increased during the year to the extent of 3,200,000 passenger car and bus miles. The largest day's

business of the year and the second greatest in the history of the companies both in earnings and traffic was Saturday, Dec. 17, when passenger receipts were \$199,099, revenue passengers 2,901,195 and total rides 5,090,097. Revenue passengers on an average weekday numbered 2,548,443, which set a new high mark. Average Saturday passengers during the year numbered 2,660,278, and for an average Sunday or holiday, 1,625,365.

The first Chicago Surface Lines bus route was started on Aug. 11, on Diversey Avenue from Crawford Avenue to Laramie Avenue. A new type twin-motor bus seating 40 passengers and equipped with pneumatic tires and air brakes was adopted for this purpose. Public approval was promptly evidenced by requests from various sections of the city for extension of this type of bus service.

The properties have been operated practically on a day-to-day city permit since Jan. 31, 1927, when the franchises expired. The first permit after that date was for six months to July 31, the next four months to Nov. 30, and after that date for one month at a time.

Accompanying this recital of the affairs of the company are some comparisons of the extent of the Surface

Items	1915	1928	Per Cent Increase
Gross earnings	\$31,966,049	\$61,624,752	92.78
Operating expenses	19,889,276	48,231,496	142.50
Taxes	1,439,279	2,900,000	101.49
Operating wages paid	10,560,039	30,280,959	186.75
Total wages paid	12,379,615	32,989,360	166.48
Revenue passengers carried	627,731,550	882,458,647	40.58
Total rides	1,115,312,129	1,585,441,127	42.15
Average fare per revenue passenger	4.99 cents	6.90 cents	38.28
Average fare per ride	2.81 cents	2.84 cents	36.65

on contest among the various divisions trainmen closed on Jan. 31, with Lincoln Avenue depot the winner.

Car mileage per pull-in due to equipment failures reached a new high average of 25,884, an increase of about 80 per cent. Compared with the showing for the fiscal year 1924, this is an increase of 424 per cent.

In the past year, 1,624 cars, or 45 per cent of the 3,639 cars owned, were overhauled and painted.

Each motor car on the system traveled an average of 37,593 miles during the year—establishing a new record for passenger equipment.

In spite of an increase of more than 3,100,000 passenger car miles during the year, there was a decrease of more than 8,300,000 kw.-hr. in power used. There was also a reduction of about \$28,000 in cost of energy output.

The bus operation installed in August, 1927, as an extension of the railway

facilities on Diversey Avenue, both with respect to character of service and type of buses employed, has given great satisfaction to the public. By an order entered Jan. 26, 1928, the Illinois Commerce Commission authorized and directed extension of this service east to Milwaukee Avenue and west to Narragansett Avenue, and by the same order authorized and directed bus service as an extension of the Belmont Avenue line between Central and Narragansett

EARNINGS, EXPENSES AND DIVISION OF RESIDUE RECEIPTS OF CHICAGO SURFACE LINES FOR YEAR ENDED JAN. 31, 1928, COMPARED WITH PREVIOUS YEAR

	1928	1927
Earnings:		
Passenger cars.....	\$60,892,995	\$60,436,705
Chartered cars.....	4,837	5,347
Newspaper cars.....	16,608	16,276
Light earnings.....	888	5,039
Capital car service.....	2,088	3,742
Advertising.....	290,263	281,837
Rents of buildings.....	174,753	160,885
Costs of power.....	98,041	108,210
Interest on deposits.....	134,438	132,366
Miscellaneous.....	9,838	23,188
Gross earnings.....	\$61,624,752	\$61,173,601
Expenses:		
Ways and structures.....	\$3,006,276	\$2,984,484
Equipment.....	4,247,920	4,188,633
Repairs.....	4,929,980	4,893,888
Power—maintenance.....	387,445	386,086
Power—operation.....	3,685,540	3,638,283
Conducting transportation—trainmen.....	21,789,269	21,485,750
Conducting transportation—other.....	3,246,443	3,214,031
Traffic.....	120,177	123,433
General and miscellaneous—damages.....	1,848,742	1,936,202
General and miscellaneous—other.....	2,071,698	1,620,696
Taxes.....	2,900,000	3,400,000
Total expenses.....	\$48,231,495	\$47,871,489
Residue receipts.....	\$13,393,256	\$13,302,111
Divided:		
Chicago Railways—60 per cent.....	\$8,035,953	\$7,981,267
South Side Lines—40 per cent.....	\$5,357,302	\$5,320,844
Includes city's 55 per cent of net divisible receipts, as defined by ordinances.		

STATEMENT OF TRACK MILEAGE OF COMPANIES INCLUDED IN CHICAGO SURFACE LINES SYSTEM

	Total Miles Single Track 1-31-27	Extensions 1927	Abandoned 1927	Net Extensions 1927	Total Miles Single Track 1-31-28	*Reconstructed 1927
Chicago Railways.....	594.80	2.30	0.01	2.29	597.09	23.35
Chicago City Railway.....	339.60	0.10	0.69	10.59	339.01	14.86
Camet and South Chicago Railway.....	127.97	0.08	.....	0.08	128.05	2.47
Southern Street Railway.....	17.45	.....	.....	.....	17.45	.....
Total.....	1,079.82	2.48	0.70	1.78	1,081.60	40.68
Includes track taken up and replaced account of sewers and special straight track renewals. † Decrease.						

TABLE OF INCREASE IN RIDING ON CHICAGO SURFACE LINES DURING PAST SEVEN YEARS

Year Ended	Weekday Average	Saturday Average	Sunday Average*	Total for Year
Jan. 31, 1928.....	2,548,443	2,660,278	1,625,365	882,458,647
Jan. 31, 1927.....	2,521,897	2,668,342	1,632,844	876,249,663
Jan. 31, 1926.....	2,424,194	2,507,004	1,631,484	842,201,453
Jan. 31, 1925.....	2,373,114	2,512,121	1,614,823	830,151,540
Jan. 31, 1924.....	2,354,139	2,521,487	1,623,414	824,850,103
Jan. 31, 1923.....	2,204,425	2,356,385	1,563,911	762,629,211
Jan. 31, 1922.....	2,129,217	2,251,293	1,560,310	750,515,622
Includes holidays. † Trainmen's strike, Aug. 1 to 6, 1922, inclusive.				

RESERVE FOR RENEWALS AND SPECIAL RESERVE FOR RENEWALS AND EQUIPMENT CHICAGO SURFACE LINES COMPANIES FOR FISCAL YEAR ENDED JAN. 31, 1928

	Chicago Railways	Chicago City Ry.	C. & S. C. Ry.	Total
Reserve for Renewals:				
Balance in reserve at Feb. 1, '27	\$9,568,220	\$5,278,957	\$348,592	\$15,195,770
Sale of unnecessary property and salvage.....	83,840	49,478	4,677	137,996
Interest earned.....	292,105	161,168	10,630	463,904
Balance in reserve at Feb. 1, 1928.....	\$9,944,166	\$5,489,603	\$363,900	\$15,797,671
Special Reserve for Renewals and Equipment:				
Balance in special reserve at Feb. 1, 1927.....	\$113,270	\$235,613	\$52	\$348,936
8 per cent of gross earnings.....	2,958,308	1,671,697	300,294	4,930,300
Interest earned.....	9,479	11,603	940	22,023
Total.....	\$3,081,058	\$1,918,913	\$301,288	\$5,301,260
Less: Expended for renewals.....	\$2,448,500	\$1,457,134	\$267,981	\$4,173,615
Expended for special equipment:				
New passenger cars.....	145,081	7,325	.....	152,407
New buses.....	57,616	.....	.....	57,616
Expended for track extensions.....	213,376	17,720	.....	231,097
Expended for track reconstruction.....	.....	142,847	.....	142,847
Total expended.....	\$2,864,575	\$1,625,028	\$267,981	\$4,757,584
Balance in special reserve at Feb. 1, 1928.....	\$216,483	\$293,885	\$33,307	\$543,675
Total of balances at Feb. 1, 1928.....	\$10,160,649	\$5,783,489	\$397,207	\$16,341,347

Under orders of the Public Utilities Commission of Illinois and of its successor, the Illinois Commerce Commission, \$8,337,705 has been expended since July, 1920, out of the "Special Renewal and Equipment Fund" for new equipment and for track extensions and reconstruction.

Although the property acquired by these expenditures is functioning as part of the operating plant, it does not appear in the Capital Accounts of the companies inasmuch as the Commission orders provide that such expenditures shall not be carried to capital account "unless and until the sum or sums thus expended have been paid into the renewal and depreciation fund."

The balance, \$16,341,347, in "Reserve for Renewals" and "Special Reserve for Renewals and Equipment" is a cash balance and is on deposit in various banks.

CAPITAL EXPENDITURES BY CHICAGO SURFACE LINES FOR THE FISCAL YEAR ENDED JAN. 31, 1928.

	Chicago Railways	C. C. Ry.	So. St. Ry.	C. & S. C. Ry.	Total
Purchase price at Feb. 1, 1927.....	\$94,438,640	\$55,776,788	\$1,801,278	\$11,729,148	\$163,745,856
Capital expenditures during year.....	110,192	31,308	1,117	33,102	175,720
15 per cent on same.....	16,528	4,696	167	4,965	26,358
Increase in fluctuating assets.....	*17,239	*11,492	.....	.....	*28,732
5 per cent on same.....	*861	*574	.....	.....	*1,436
Purchase price at Feb. 1, 1928.....	\$94,547,260	\$55,800,725	\$1,802,563	\$11,767,216	\$163,917,765
*Decrease.					

STATISTICAL DATA OF CHICAGO SURFACE LINES FOR THE FISCAL YEARS ENDED JAN. 31

Rate of fare.....	1923 8 cents 2-1-1922 to 6-14-1922 7c-6½ cents 6-15-1922 to 1-31-1923	1924 7c-6½ cents	1925 7c-6½ cents	1926 7c-6½ cents	1927 7c-6½ cents	1928 7c-6½ cents
Revenue passengers.....	762,629,211	824,850,103	830,151,540	842,201,453	876,249,663	882,458,647
Passenger receipts.....	\$55,495,310	\$56,986,687	\$57,284,602	\$58,076,487	\$60,436,705	\$60,892,995
Operating wages.....	56,102,061	57,655,169	58,081,678	58,785,880	61,173,601	61,624,752
Operating expenses and taxes.....	27,163,996	27,458,736	29,246,390	29,012,641	29,812,518	30,280,959
Revenue receipts.....	17,252,072	17,381,016	17,328,569	17,615,564	18,058,971	17,950,536
Revenue receipts.....	11,686,992	12,815,416	11,506,717	12,157,674	13,302,111	13,393,256
Joint account expenses.....	620,000	885,000	450,000	130,297	363,934	657,338
5 per cent on purchase price.....	\$11,066,992	\$11,930,416	\$11,056,717	\$12,027,376	\$12,938,176	\$12,736,217
5 per cent to city.....	8,039,343	8,076,569	8,127,158	8,169,099	8,173,948	8,190,354
5 per cent to companies.....	1,665,206	2,119,615	1,611,257	2,122,052	2,620,325	2,500,224
	1,362,442	1,734,231	1,318,301	1,736,224	2,143,902	2,045,638

Avenues. The Chicago Motor Coach Company is seeking to have the commission set aside this order.

Newspaper advertisements, frequent articles in the news columns and in trade papers and magazines, liberal use of car cards and public meetings at which talks have been made and motion pictures shown were the principal mediums of publicity.

The three motion pictures that were previously produced have proved so popular that it was decided to prepare another. "Safe Highways," a two-reel picture on the subject of safety, was completed the latter part of January. Through the speakers' bureau, consisting of employees of the company, 258 organizations with audiences totaling 59,800 were reached during the year. A route and sightseeing guide was distributed to 500,000 persons during the year and a new guide was issued Jan. 1.

BUILDING UP A SALES FORCE

Every uniformed employee was impressed with the fact that his own interests were identical with those of his employers in securing and retaining the good will of his daily customers. More than usual care was exercised in the selection and training of new employees.

In conclusion President Henry A. Blair said:

Notwithstanding the handicaps of expired franchises and operation under temporary municipal permits, the Chicago Surface Lines continued with all the vigor and enterprise of an efficient industrial organization, to give the people of this city the highest type of street car service. Although borrowing power was curtailed by the franchise situation, more track, new and rebuilt, was constructed by this system than by any other street railway in the country. Service was increased materially and a beginning was made in the establishment of feeder bus routes with buses of improved design.

INCREASE IN RIDING SIGNIFICANT

Perhaps the most significant fact, however, is the continued and consistent increase in riding. In a year when decrease in business was the rule in street railway operation, this system showed a substantial gain over the previous fiscal period. This has been true of every year for the past six years.

The Chicago Surface Lines alone of the street railways in the eight American cities with a population exceeding 700,000 had a greater number of revenue rides in 1927 than in 1923.

Undoubtedly so outstanding an example of successful operation is not a mere chance occurrence. It is due to the consistent policy of improvement in service, effective maintenance of property and the constant effort to encourage riding by fitting transportation to the needs of the community to as great a degree as legal and financial restrictions would permit.

It is to be hoped that these restrictions may be removed in the near future by the enactment of enabling legislation by the State and agreement between the city and the companies on a plan adequate for present and future needs of Chicago, including unification of the elevated and surface properties with subways and feeder bus lines organized under a terminable permit from the city affording the necessary basis for ample financing.

Hearing on Accounting for Railroads Adjourns

The hearing before Commissioner Eastman and Examiner Buntin of the Interstate Commerce Commission on a system of depreciation accounting for steam railroads proposed by the commission in docket No. 15,100, was temporarily adjourned on March 15 after a brief session, to March 19, when testimony on a proposed system of depreciation accounting for telephone companies was to be taken up.

It is expected that in the case of the electric railways similar consideration will be shown at the conclusion of the steam railroad inquiry.

Santa Barbara Property Offered to City

The Santa Barbara & Suburban Railway, Santa Barbara, Cal., a subsidiary of the Southern California Edison Company, is willing to give its property to the city of Santa Barbara, if the city is willing to take it according to F. B. Lewis, assistant general manager of the Edison company. He made this announcement during the course of a hearing before a State Railroad Commission examiner on the abandonment of a bus line on March 9. Earle Ovington, real-estate operator, had appeared to protest against the discontinuing of the bus service, on which excessive losses were claimed.

Mr. Lewis explained that the railway property could be turned over to the city subject only to the assumption

by it of certain mortgage obligations now outstanding.

The system in Santa Barbara consists of about 9 miles of railway line and 5 of bus routes.

Indianapolis and Cincinnati Bonds Case Complicated

Hearings were conducted recently in the Federal Court in Indianapolis, Ind., on the application of Fred H. Kelley, a stockholder of Mattoon, Ill., for appointment of a receiver for the Indianapolis & Cincinnati Car Trust Equipment Company, on the ground that no dividends or principal maturity payments had been made since November, 1926.

The trust equipment company was formed in 1923 to finance the construction of ten substations along the lines of the Indianapolis & Cincinnati Traction Company, now in receivership.

Proceeds of the bond sales were used to build the ten substations required when the railway adopted direct current and for the purchase of twelve new cars.

The case recalls recent action by bondholders' committees which approved the sale of the railway to Charles T. DeHore, Toledo, and others. The total par value of bonds which were acquired by the DeHore group was \$2,600,000.

In buying the railway bonds, however, the DeHore group stood to come into possession only of the tracks, poles, right-of-way and station equipment, since all rolling stock, substations and

Conspectus of Indexes for March, 1928

Compiled for Publication in This Paper by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago		Year Ago		Since War	
		Feb.	March	Feb.	March	High	Low
Street Railway							
Fares*	March 1928	1928	1927	1928	1923		
	7.61	7.59	7.43	7.61	6.88		
1913 = 4.84							
Electric Railway							
Materials*	March 1928	Feb. 1928	March 1927	Sept. 1920	Feb. 1928		
	140.1	139.5	152.1	247.5	139.5		
1913 = 100							
Electric Railway							
Wages*	March 1928	Feb. 1928	March 1927	Sept. 1920	March 1923		
	228.8	228.7	226.7	232	206.8		
1913 = 100							
Am. Elec. Ry. Assn.							
Construction Cost	March 1928	Feb. 1928	March 1927	July 1920	May 1922		
(Elec. Ry.) 1913 = 100	200.5	200.9	203.0	256.4	167.4		
Eng. News-Record							
Construction Cost	March 1928	Feb. 1928	March 1927	June 1920	March 1922		
(General) 1913 = 100	204.6	204.6	208.8	273.8	162.0		
U. S. Bur. Lab. Stat.							
Wholesale Commodities† 1926 = 100	Feb. 1928	Jan. 1928	Feb. 1927				
	98.4	96.3	95.9				
Bradstreet							
Wholesale Commodities 1913 = 9.21	Mar. 1 1928	Feb. 1 1928	Mar. 1 1927	Feb. 1 1920	June 1 1921		
	13.34	13.53	12.55	20.87	10.62		
U. S. Bur. Lab. Stat.							
Retail Food	Feb. 1928	Jan. 1928	Feb. 1927	July 1920	March 1922		
1913 = 100	151.6	155.1	156.0	219.2	138.7		
Nat. Ind. Conf. Bd.							
Cost of Living	Feb. 1928	Jan. 1928	Feb. 1927	July 1920	Aug. 1922		
1914 = 100	161.5	163.1	165.2	204.5	154.5		
Steel Unfilled Orders							
(Million Tons)	Feb. 29 1928	Jan. 31 1928	Feb. 28 1927	July 31 1920	May 31 1927		
1913 = 5.91	4.388	4.276	3.697	11.118	3.051		
Bank Clearings							
Outside N. Y. City	Feb. 1928	Jan. 1928	Feb. 1927	Oct. 1925	Feb. 1921		
(Billions)	16.39	19.73	16.72	20.47	10.43		
Business Failures							
Number	Feb. 1928	Jan. 1928	Feb. 1927	Jan. 1924	Jan. 1925		
Liabilities (Millions)	1885	2178	1855	2231	1353		
	50.62	54.03	56.34	128.95	27.22		

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in 8 United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel, used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 181 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

†This index is changed to a base of "1926 = 100." The notation replaces the former basis of "1913 = 100." Inasmuch as the bureau has not calculated the index on this new base any further back than January, 1923, no figures are shown in this tabulation for the high and low point since the war. It is planned to compute the index on this new basis as far back as January, 1913. Until such time as the bureau make public these figures for the earlier years this information will be lacking.

copper wire were obtained on conditional sales contract by the railway from the trust equipment company.

Soon after the bond sale had been approved, Mr. DeHore and his associates started negotiations for control of the Indianapolis & Cincinnati Car Trust Equipment Company. They are said to have been successful in buying the \$140,000 of Series B stock and 25 per cent of the \$600,000 Series A, or only about \$190,000 of the total of \$740,000 stock outstanding. Recently it has been reported an organized group of stockholders of the Car Trust Equipment Company had resisted the offer made by the DeHore faction, and that in consequence a situation had been created which threatened practical dismantlement of the line of the Indianapolis & Cincinnati Traction Company.

Stockholders at Washington Approve Merger Idea

Stockholders of the Capital Traction Company, Washington, D. C., at a special meeting on March 15 ratified the transit merger agreement by a margin of approximately 8,000 votes. The day before the Washington Railway & Electric Company stockholders took similar action. Chairman Childress of the Public Utilities Commission declared he was going to do everything possible to bring about a merger now. He said:

We must strike while the iron is hot. Any postponements of the merger for an indefinite period perhaps would jeopardize efforts to bring about the long-desired unification of the transit lines, which would indicate that the commission has no intention of holding any public hearings.

Move in Foreclosure Proceedings Against Long Island Line

A further step to conserve the interests of bondholders of the New York & Long Island Traction Company, which ceased operation at midnight on April 5, 1926, was taken recently when judgment was entered in the Nassau county clerk's office in Hempstead for \$1,163,449, in foreclosure proceedings by the Union Trust Company as trustee of the mortgage which guaranteed the bonds. The railway has been in receivership since Dec. 21, 1923.

Abandonment of Interurban Lines in Lincoln Sought

Abandonment of its trackage from 1st and Y Streets to the downtown business district terminal at Fourteenth and O Streets is planned by the Omaha, Lincoln & Beatrice Railway, Lincoln, Neb. The City Council and the State Railway Commission are being asked to approve the removal of the tracks and the stopping of service.

President Harvey Musser of Akron takes the position that the company cannot afford the assessment for pay-

ing that will be placed upon it by reason of the authorization of a new district which includes a considerable portion of its trackage. Considerable of its interurban traffic has been diverted to the railway company's buses.

Baltimore to Reclassify Unissued Stock—February Gross Gains

Stockholders of the United Railways & Electric Company, Baltimore, Md., at their annual meeting to be held on April 11, will be asked to approve of an amendment to the charter of the company to empower the board of directors to classify or reclassify any unissued stock of the company in the form of preferred stocks, and to issue and sell convertible securities. The initial step in this direction was taken by the board at its monthly meeting on March 20, a resolution recommending such action having been adopted. President C. D. Emmons said:

The company, in order to avoid the annoyance and expense of a special meeting, has included in the notice for the annual meeting a resolution giving power to the company, through its directors, to file an amendment to the company's charter authorizing the issue and sale, subject to the approval of the Public Service Commission of Maryland, of any part of the present authorized but unissued common stock in the form of preferred stocks, and to issue and sell convertible securities.

This authorization has no immediate significance from the standpoint of financing the company, as the company's position does not at present justify the use of such securities, but it was thought well to give the company the power, through its directors, to take either or both of these steps, if later they seem to be advantageous.

The total amount of the authorized capital stock of the company is \$35,000,000 par value, divided into 700,000 shares of the par value of \$50 each, all of which are common stock. Of the authorized stock 409,224 shares are outstanding.

Earnings from Jan. 1 to Feb. 29 (60 days), 1928, compared with 1927 (59 days), were as follows:

	1928	Increase
Passenger rev.....	\$2,617,513	x\$22,670
Other revenue.....	33,595	x2,211
Totals	\$2,651,108	x\$24,882
Oper. expenses.....	\$1,676,907	\$46,600
Depreciation	132,555	x1,244
Totals	\$1,809,462	\$45,355
Net oper. rev.....	\$841,645	x\$70,238
Taxes	258,237	x14,313
Oper. income.....	\$583,408	x\$55,924
Non-op. income.....	21,933	398
Gross income.....	\$605,342	x\$55,526
Fixed charges.....	474,872	7,055
Remainder	\$130,470	x\$62,582
Interest on income bonds	93,333	.....
Net income.....	\$17,136	x\$62,582
xDecrease.		
Net income by months was:		
	1928	1927
January	\$18,366	\$72,128
February	18,769	27,590
	\$37,136	\$99,718
		x\$62,582
xDecrease.		

Fares were changed at midnight, Feb. 12, 1928, from 8-7½ cents for adults and 4 cents for children to 9-8½ cents for adults and 5 cents for children. There was no change in commutation or school ticket rates. For the month of February revenues and expenses are for 29 days in 1928, as compared with 28 days in 1927. Expenses for 1928 are at increased wage over 1927—2 per cent effective Jan. 1 and additional 2 per cent effective Feb. 12.

Protest Voiced Against California Tax System

Before an open forum meeting held recently by the California Tax Commission, attorneys for the electric railways in southern California protested against the present system of state taxation. The present state tax was declared to be a serious burden which increases yearly. It was declared that no electric railway in California is making an equitable return on its investment.

A substantial reduction in the present gross receipts tax of 5½ per cent was advocated by W. D. Hill, representing the Electric Railways Association. He suggested that relief should come from stringent paving requirements imposed on the railways, and expressed the belief that municipally owned public utilities should be taxed in proportion to assessments levied on privately owned utilities. In his opinion no state electric railway was making in excess of 5 per cent of its investment and most of them were making only 1 per cent.

Council Approves Increase in Philadelphia Capital

Increase of the capital stock of the Philadelphia Rapid Transit Company, Philadelphia, Pa., from \$60,000,000 to \$65,000,000 has been approved by the transportation committee of the City Council.

Of the \$5,000,000 increase, \$1,500,000 will be used for relocating the Market Street subway-elevated tracks under City Hall and for necessary changes in the underground stations. Another \$1,500,000 is to be used in the construction of a garage for 500 motor cars, company buses and taxicabs beside the Fern Rock terminal yards of the Broad Street subway. The balance of \$2,000,000 will be used in acquiring real estate for another garage in Locust Street, on the site of the old Hollingsworth school, at the rear of the Academy of Music.

In reply to a question about provision in the ordinance that any of the money not spent on the projects named could be used for other capital purposes Coleman J. Joyce, counsel for the company said:

That is right, but we do not expect to change the purposes enumerated in this ordinance. These figures are estimated, and sometimes such figures are under or over final costs. In case there is an underestimate, we must have a free hand to meet the costs out of the capital.

Personal Items

A. A. Mitten Succeeds T. E. Mitten as Chairman

At the annual meeting of the stockholders of the Philadelphia Rapid Transit Company, held on March 21, the following directors were elected to serve for a period of one year: A. A. Mitten, W. K. Myers, J. A. Queeney, R. T. Senter, R. F. Tyson, L. W. Hackett, J. McCartney and J. C. Haungs.

Mayor Harry A. Mackey, by virtue of his office, also serves as a director. E. T. Trigg and J. S. McCullogh are the other directors representing the city under the 1907 city-company agreement. T. E. Mitten resigned as chairman of the board so that the employees might have three representatives instead of two.

The employee representatives on the board are L. W. Hackett and J. McCartney, president and vice-president of the Employees' Co-operative Association, and J. C. Haungs, chairman of the general committee for employees under the Mitten plan. Mr. Hackett is a general repairman in the rolling stock and building department, Mr. McCartney is a driver in the bus department and Mr. Haungs is a paper cutter in the printing department. The board of directors thus consists of five men who are directly concerned in the management of the property, three who are representatives of the employees and three who represent the city.

The meeting of the new board of directors was held directly following the stockholders' meeting. A. A. Mitten was elected chairman of the board of directors and W. K. Myers vice-chairman. Mr. Myers becomes chairman of the executive committee, the membership of which also includes A. A. Mitten, J. A. Queeney and R. T. Senter.

The board of directors elected the following officers of P.R.T.: President, R. T. Senter; general counsel, E. A. Ballard; vice-president, R. F. Tyson; comptroller, W. M. Campbell; secretary of board, A. N. Hinkel; auditor, R. C. Williams; treasurer, G. W. Davis; secretary, F. B. Ellis.

G. D. Rushing Promoted at Shreveport

G. D. Rushing, formerly master mechanic of the Shreveport Railways, Shreveport, La., has been promoted to the post of, superintendent of power and equipment. Mr. Rushing entered the service of the company in 1903, when it was known as the Shreveport Traction Company, as a motorman and conductor. He continued in this work for about a year and a half, meanwhile directing his energies to work in the shop. He acquired a good deal of practical experience and as a result was made master mechanic in 1907.

This position he held until he was made superintendent of power and equipment.

Mr. Rushing was born in 1878 in Wood County, Tex. He lived on a farm until he was sixteen years of age when he became a clerk in a store. Here he remained for two years. Then he returned to school for a few years.

R. F. Palmblade President of Illinois Association

R. F. Palmblade was elected president of the Illinois Electric Railway Association at the convention held in Springfield, Ill., March 14-15. The new president entered the utility business in 1910 as foreman in the construction depart-



R. F. Palmblade

ment of the Illinois Traction System. From the latter part of that year until 1912 he served as draftsman in the engineering department. During the next four years his headquarters were in Peoria, as operating engineer with the Peoria Railway. From this work he went to Jefferson City, Mo., serving in the capacity of general superintendent of the Jefferson City Light, Heat & Power Company and the Jefferson City Bridge & Transit Company. This work covered a period of three years from 1917 to 1920. Then he returned to the Peoria property taking on the duties of general superintendent until 1924. Since that time he has been manager of the Peoria Division of the Illinois Power & Light Corporation.

M. O. BENEDICT has succeeded G. D. Rushing with the title of active master mechanic of the Shreveport Railways, Shreveport, La. He began his career in the electric railway industry in 1906 and located in Shreveport in 1920, becoming chief electrician for the Shreveport Railways. This position he has held until his recent appointment. Mr. Benedict was born in New Madrid County, Mo., in 1889. He was educated in the public schools.

Messrs. Cooke, Bosserman and Ross Promoted in Pittsburgh

M. W. Cooke has succeeded A. J. Fink as superintendent of traffic and schedules of the Pittsburgh Railways, Pittsburgh, Pa. As was mentioned in the *ELECTRIC RAILWAY JOURNAL*, issue of March 10, Mr. Fink is now transportation engineer of the St. Louis Public Service Company, St. Louis, Mo.

Mr. Cooke entered the employ of the Philadelphia Company (the holding company of the Pittsburgh Railways) in 1911 as superintendent of the telephone department. In July, 1924, he was made superintendent of the overhead lines department of the railways, and in December of the same year was appointed chief of the current control department. He remained in this capacity until September, 1926, when he assumed charge of power and inclines. He was serving as superintendent of power and inclines at the time of his recent appointment.

Mr. Cooke was educated at Baltimore City College and John Hopkins University.

Assisting him in his new work is Traffic Engineer P. R. Bosserman, who has been associated with Mr. Cooke since 1925. Mr. Bosserman started with the railway company in 1915 in the substation department, but in 1925 was appointed by Mr. Cooke supervisor of maintenance and construction in the overhead lines department. In 1927 he was promoted to the office of superintendent of substations and inclines. This latter position he held until his recent appointment as traffic engineer.

The vacancy caused by the resignation of Mr. Cooke as superintendent of power and inclines has been filled by John L. Ross, until recently, engineer of power and inclines. Mr. Ross, a graduate of Carnegie Tech in electrical engineering, has been with the Pittsburgh Railways since 1917, when he entered the services of the company in the load dispatcher's office. He was later made chief load dispatcher, and then inspecting engineer of the technical division until his appointment as power and incline engineer in 1926.

H. M. Gould Editorial Consultant

Harold M. Gould, formerly electrical engineer and assistant general manager of the Department of Street Railways at Detroit, Mich., and previously student engineer in all departments of the metropolitan street railways in New York, has been added to the staff of *Nation's Traffic* as engineer adviser. The magazine, published monthly in St. Louis, is devoted to solving street and highway traffic problems.

Mr. Gould was graduated from the Sheffield Scientific School, Yale University, in 1907. Subsequently he served two years in the electrical department of the Long Island Railroad, and later joined the Metropolitan Street Railway in New York. He was with the city engineering department of

Bridgeport for eight years following, and thence went to New Haven to join the electrical department of the Connecticut Company. He left this company to become electrical engineer and assistant general manager of the Department of Street Railways in Detroit.

For the last two years Mr. Gould has been transportation engineer with Dodge Brothers, Inc., meanwhile acting as consulting engineer with the Detroit Police Department. In this capacity he recently completed a comprehensive survey of traffic in Detroit in which he recommended measures to be taken to remedy that city's traffic ills.

OSCAR A. BENNETT has assumed the position of assistant comptroller of the Puget Sound Power & Light Company, Seattle, Wash. Mr. Bennett for the past four years has been assistant treasurer of the Blackstone Valley Gas & Electric Company. John W. Kelly has succeeded him. Mr. Kelly had been assistant treasurer of the Baton Rouge Electric Company, Baton Rouge, La.

H. V. Wenger on Indiana Commission

Earl L. Carter has resigned as chief engineer of the Indiana Public Service Commission effective on April 1, to enter private consulting work. In his position as engineer for the commission, one of his principal duties was to fix valuations of utilities for rate-making purposes. He entered the service of the commission in 1917 as assistant engineer and succeeded Harry O. Garman as chief six years ago. He was graduated from Purdue University in 1914.

Harry V. Wenger, former member of the engineering staff of the commission, has been selected as Mr. Carter's successor. Mr. Wenger took a position with the commission in 1917. He served on the commission engineering staff more than three years. He left in 1923 after having been elected chief engineer of the Railroad Commission of South Dakota. Later he returned to Indianapolis and has been in private engineering work since that time.

The Story of Sam Greenland

Another railway official regarded as good diet for popular consumption is Sam Greenland, who was featured in the Sunday, Jan. 22, issue of the *St. Louis Globe Democrat*. All JOURNAL readers know by this time the work-loving, 48-year old general manager of the St. Louis Public Service Company, and residents of his city look to him to supply them with the best car service. The writer of this article says that long before he became an expert in the operation of electric railways he was a tool dresser in the oil fields, a lumberman, a clerk by day, a bill collector at night and a telephone lineman. How he happened into the railway business and what he made of it are now history, recorded from time to time in these pages.



Thomas H. David

Messrs. David and Tretton Advanced in Indianapolis

Promotion of two veteran employees of the Indianapolis Street Railway, Indianapolis, Ind., was announced recently by Robert I. Todd, president. They are Thomas H. David and James P. Tretton.

Mr. David, principal assistant engineer, has been promoted to chief engineer. He succeeds T. B. McMath, who has retired from active service because of ill health but retains the position of consulting engineer. Mr. David has had a long career in railroad work. After he was graduated from Purdue University in 1901, he spent the next six years on steam railroads in bridge, maintenance and construction work, being identified with some of the early elevation work in Indianapolis. In 1905 he received the advanced degree of civil engineer from Purdue University. Since 1907 he has been assistant and principal assistant engineer.

During the construction of the joint interurban terminal freight houses in Indianapolis in 1923 Mr. David was supervising engineer. These are believed to be the largest interurban freight facilities of their kind in the world, costing approximately \$900,000. The houses have 43,160 sq. ft. of floor space under cover and 3 miles of tracks on the property which cover an area of approximately 12 acres.

Mr. David was born in Indianapolis Aug. 18, 1876. He is a member of the American Society of Civil Engineers.

The appointment of James P. Tretton, superintendent, to the position of

general superintendent, comes as a well-merited acknowledgment of his 30 years continuous employment in the various departments of the Indianapolis Street Railway. He entered the company's service in 1898. It may be said that the electric railway business was Mr. Tretton's "first love" as he began his career after leaving school, at the age of fifteen years, his first position being in the truck department of the company's shops. Later he was promoted to the storeroom at the shop. In 1904 he was appointed paymaster. Three years later he was placed in charge of arranging schedules for the operation of the different lines. In 1907 he was advanced to the position of assistant superintendent and in 1919 he was made superintendent. On Jan. 1, 1928, he was advanced to the post of general superintendent.

J. A. BROMLEY, general manager and engineer of York Corporation Tramways, York, England, has been appointed general manager of Durban Corporation Tramways, South Africa. Before going to York Mr. Bromley held prominent tramway positions at Leeds and afterwards at Keighley.

Obituary

CHARLES P. HOWARD, president of James L. Howard & Company, Inc., Hartford, Conn., manufacturers of railway car supplies, died March 6 at his home in that city. Mr. Howard was educated in the Hartford schools and later matriculated at the Massachusetts Institute of Technology. After graduation as a mechanical engineer he became associated with the Howard company where he spent his business life. He was 74 years old.

DARLING L. WILSON, an employee of the Dallas traction lines for the past 41 years, and the Dallas Railway & Terminal Company since its organization, died recently in that city. Mr. Wilson was the author of a history in which he traced the development of railway traffic in Dallas from the days of the first mule car up to the present time.

W. N. OLDHAM, the oldest trainman in the employ of the Portland Electric Power Company, Portland, Ore., died Feb. 15, after 40 years of service. He was operator of the first horse car on the east side, and when cars were electrified he was placed on the Woodstock line. Since that time he had worked on various lines, with no major accident while in service. Mr. Oldham was 77 years old and worked up to June of last year.

STANLEY SHAFFER, 67 years old, prominent member of the Cincinnati Bar, died recently. He was associated with the builders of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad from its inception, a connection which continued until his death.



James P. Tretton

Manufactures and the Markets

How Price Cutting Works

A Close-Up Picture of the Tension that Exists Between the Seller and the Purchaser in the Utility Industries

BY EARL WHITEHORNE
Commercial Editor "Electrical World"

In the Feb. 18 issue of ELECTRIC RAILWAY JOURNAL Mr. Whitehorne outlined the evils that result from the present "buyer's market" for utility equipment. In this article he cites some of the purchasing and selling practices that are not in accord with sound business principles.—EDITOR.

IT IS perfectly natural and practical and proper for the purchasing agent to buy as cheaply as he can. And it is no less right for the manufacturer who sells the goods to get as profitable a price as possible. But in the evolution of business certain principles have developed and certain responsibilities. The trickery that once was the life and sparkle of horse trading, is now frowned upon. Fair dealing has become the accepted standard in commerce. The seller is supposed to give honest value and the buyer is expected to pay an honest price. Why, then, is there so much talk right now of trouble between large buyers and sellers? What has gone wrong in the market place that there is bitter talk of price cutting by manufacturers and profiteering by purchasers?

TRICKS OF THE PURCHASER

Study it a bit and you find an interesting thing. There are some manufacturers who have the courage to establish prices and maintain them. Their price is their price and they refuse to dicker. But there are some who lack the courage or the strength. And just so there are some purchasing agents who do not haggle. They ask for bids from suppliers whose product is acceptable and the low man gets the business. But there are others who seem to consider their function one of dollar squeezing; and the length to which this gentle art is carried is astonishing.

The number and variety of tactics employed by these purchasers are without end, but there stand out certain typical situations:

1. Where the purchasing agent gets the high bidder to cut on the indefinite promise of a large block of business next year.
2. Where the buyer lies, giving a bidder the false intimation as to his competitor's price, or representing the competing price on motors alone, for instance, as the complete price for motors and control or citing a price on equipment that is not comparable, or ringing some other subtle change on the truth that deceives and tempts the bidder to cut.
3. Where the large buyer demands spe-

cial discounts for large volume, claiming that this volume carries the manufacturer's overhead, and thus forces the big manufacturers' price down to where the small manufacturer cannot compete.

4. Where very large buyers of electrical equipment that is used as part of a manufactured product threaten to make their own equipment unless the price is cut.

5. Where large utility holding companies argue that one of the savings possible through holding company operation should show up as savings in purchases, and demand discounts greater than those given to operating companies, which eliminate the small manufacturer and force the large manufacturer's price below the margin that provides for the further development of bigger and better apparatus.

6. Where purchasing agents apparently do not know how to buy because they have no facts to check bids with and no methods of evaluating bids and therefore resort to haggling.

WHAT THE SELLER DOES

That's what they are saying about the purchasing agent—not all, of course—but many. But what is the matter with the manufacturer? you'll say. Why does he fall for such methods? There is the rub. The manufacturer right now finds himself in a buyer's market. He has permitted himself to become involved in a mad scramble for orders that has enmeshed him until for every story reflecting upon the purchasing agent there are fourteen about manufacturer and his salesman. As one man put it—"You can take a pure young man and make him a purchasing agent today and before Sunday the manufacturer's salesman will have taught him all the dirty tricks in the business."

The utility purchasing agents say that the manufacturers are themselves the greatest culprits and are responsible for price buying. They say that first bids today are made for trading purposes only. Therefore, they say, they too must use trading methods because those are the methods that the manufacturers have developed and seem to understand. The purchasing agents say that they are willing to pay fair prices but that the manufacturers haven't the courage to put fair prices on their products and then stick to them.

The small manufacturer also charges that although the large manufacturers state that they desire competition and see no virtue in monopoly, yet they chafe under the competition of the small manufacturer and cut prices to get business, relying on price cutting and not on

better quality, better delivery or better salesmanship to maintain their position. It is alleged that the spread of prices established by these larger manufacturers is unreasonably wide and is not justified by the savings effected in making and selling the larger quantity to the large buyer. In this competition between the manufacturers also, certain typical conditions stand out—

TRICKS OF THE MANUFACTURER

1. The large manufacturer uses the lump sum bid as a lever to lower prices on individual products to compete with the small producer who specializes in that line. It is said that at times this is so manipulated that it has the effect of a straight price cut.

2. Allowances are made on old equipment taken back that range all the way from a reasonable scrap allowance to the full original price. This is pure price cutting when the allowance is more than the seller may reasonably expect to realize from the second-hand value.

3. Some manufacturers are making extravagant contributions in preliminary engineering expense for detailed working data that is out of all reason and constitutes a price consideration because it puts an undue extra burden on the profit.

4. Financial affiliations between some manufacturers and the utility companies are used to bringing pressure from on high to throw the order.

5. Reciprocity arrangements are drawn into competitive bids to an extent that overshadows the actual comparative values involved and works an injustice upon bidders who are invited to compete with the assumption that it is to be a fair and open contest.

6. And then there are the everyday conditions of price cutting where the manufacturer loses his nerve and pares his price for no other purpose than to get the order and camouflages it with all manner of alibis and explanations, such as a mistake in figuring, or new information or an unexpectedly favorably purchase of materials or some other cock-and-bull story.

THE MORAL ASPECT

There are many time-honored practices that some day will give way to the onward march of principle and be changed. There are many things that men used to do that have been stopped and are not countenanced today. After all, it gets down to a very simple consideration of plain honesty. If a purchasing agent lies or otherwise deceives a bidder into cutting his price, he is not dealing honestly. He is not fair. And if a manufacturer offers a bid that is not fair, either because the goods are not worth the money, or because he has padded the price for trading purposes, he is not dealing honestly.

Everybody will agree that it is considered wrong to slip your hand into a man's coat pocket and extract his wallet while his attention is distracted. No purchasing agent will do this to a salesman. No manufacturer will do it to a buyer. Well, the only difference is that dickering with bids and cutting prices has not yet lost its social standing. Today it involves no conspicuous degree of moral turpitude. But gradually the day will come when between intelligent business men price cutting will be taboo.

It is a matter of simple inescapable truth that destructive commercial warfare between competitors or between buyers and sellers eventually demoralizes markets, wrecks the economic health of the industry, and ultimately paralyzes the service upon which the public is dependent. And that is the reason why we find modern business bulwarked about with codes and standards and principles, with a highly developed system of self imposed controls that have evolved out of experience because without co-operation and mutual good will there is no safety for investment, no stability upon which to base projects and plans.

TWO OBJECTIVES

The greatest single problem in this whole situation to my mind is the difficulty of shaking men loose from the purely negative idea that because these unintelligent buying practices are general and have existed for long, they can't be changed. But that is just foolishness. Every buyer wants to get his money's worth. Every seller wants to get a fair price. No more, no less is satisfactory. What can be done, therefore, to put an end to the haggling and the price cutting? Fundamentally it seems to me there are two things to be done:

*One—By the purchaser—*Industry needs more intelligent buying. It needs purchasing agents who know the values of the equipment they buy, and make of their function something more than an adroit matching of prices. It needs recognition that what is bought must be paid for and that bids which embrace elements of engineering, and of service as well as the delivered product, cannot be compared by a mere tallying of the total cost figures.

*And Two—By the manufacturer—*Industry needs more sincerity in selling. It needs manufacturers who consider that a bid is a word given—an honest offer of service to a friend—and not just a gesture in a sparring match. In other words, a bid from a responsible concern to a reputable customer should be a firm bid, the pledge of the house, signed with its good name. And such a bid is the equivalent of an open bid because there is no trick in it. It is not subject to a revision, any more than the written word of that manufacturer is subject to question, because his honor is involved.

All this will not happen at once—not

this week. I know it. But industry can work toward it—can fight for it. And the logical approach to it is for the seller to refuse longer to cut his price because the buyer tells him to. Let him at least begin to protect himself by making sure that the other bids that he is asked to beat are comparable and that the purchasing agent is not lying. If he is asked to refigure after the bids are in let him at least demand that all the bids be opened to inspection. And also, it is time the manufacturer knew a little more about the reasons why he loses orders, through regularly organized post mortem studies of the bids on his closed business.

Wheeler and Childress Railway Planned

Construction of an electric inter-urban railway between Wheeler and Childress, Tex., approximately 80 miles, is planned by the group of large oil companies which are operating in the Panhandle District. Electric power for the proposed line will be furnished by the West Texas Utilities Company which already has a power transmission line along the entire route of the proposed railway. Although it is intended that the electric railway shall handle passenger traffic, its chief purpose will be to give the oil fields of these companies an additional transportation outlet. The road will pass through Shamrock, Wellington and serve other smaller towns.

First of Twelve New Macon Cars Shipped

The first of the twelve new units for the Macon Light & Railway Company built by the Perley A. Thomas Car Company were shipped on Feb. 22. The second one was scheduled for shipment the last of that week. Delivery of the remainder is at the rate of two cars per week until completion of the order.

The cars are of the one-man double-end double-truck type, all steel design. They have an over-all length of 41 ft. 8 in. and a seating capacity for 40 passengers. Green and cream is the color scheme of the exterior, and the interior trim is of cherry. Specifications were printed in *ELECTRIC RAILWAY JOURNAL* issue of Oct 15.

Madagascar to Electrify

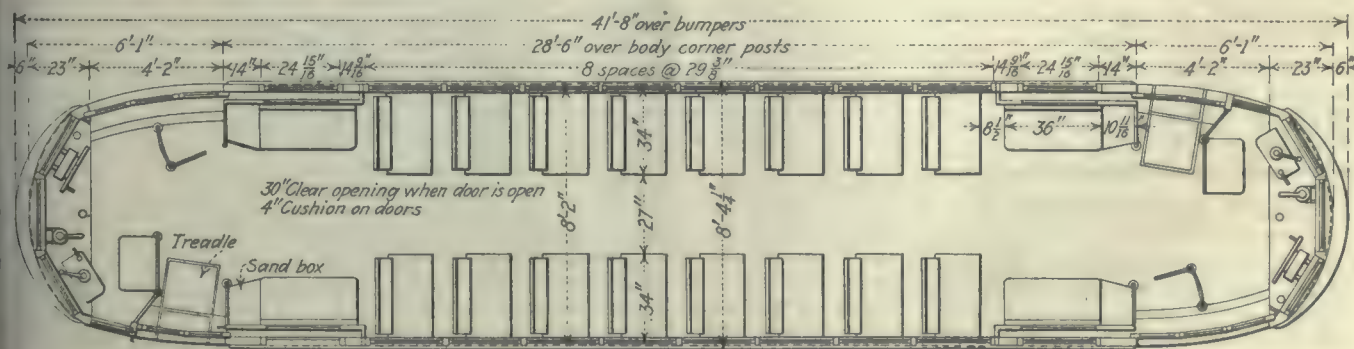
The government of the French colony of Madagascar has approved a project for the partial electrification of the Tananarive-East Coast main line railway to make use of the potent waterfalls located on the Mangoro River. The project is estimated to cost 20,000,000 francs, not including electric locomotives. It will take six years to complete. The work will probably not be undertaken before late in 1928.

Employment Activity on Increase

Employment and activity in the manufacturing industries of the United States have been on the increase since November, 1927, it is indicated by the January, 1928, returns from about 2,000 manufacturing plants reporting monthly to the National Industrial Conference Board, New York. These plants are located throughout the various sections of the country, are of both large and small size and represent 25 different divisions of manufacturing. Inasmuch as midwinter is a quiet period in many industries, seasonal influences should show further improvement in February and March employment when the data for these months become available, in the view of the board.

January figures show more than 1 per cent increase over the number employed last November which, according to the conference board's reports, was the lowest ebb of employment for the year 1927 and the lowest since the last quarter in 1924. However, not only has the number of employed increased, but the total number of hours worked in these plants shows an even greater increase, totalling $3\frac{1}{2}$ per cent more than in November, 1927. This, the conference board points out, indicates not only more employees at work but an increased number of working hours per employee, and thus an increase in activity exceeding that indicated by the additional number of men engaged. Average weekly earnings per worker during January showed proportionate increase.

The decline in employment in the manufacturing industry during the year 1927, which came to a halt in December, amounted to only $3\frac{1}{2}$ per cent for the entire year from January, 1927, to January, 1928. There was a decrease in manufacturing employment in



Floor plan of new Macon cars

January, 1928, as compared with January, 1926, when industrial activity was near the peak of the 1921-1927 period. The total number of hours worked, in January, 1928, was $8\frac{1}{2}$ per cent lower than in January, 1926, and 4 per cent lower than in January, 1927.

Steel for Subway Work

Bids will be taken March 30 on 7,700 tons of structural steel for a subway section near Prospect Park, Brooklyn. The state of North Carolina is in the market for 3,000 tons for state highway bridges near Wilmington.

American Bridge Company has taken 500 tons of bridge work for New York State, and an inquiry is in the market for 500 tons additional. Erie Railroad is inquiring for 250 tons for a pier on the Hudson River in Jersey City.

ROLLING STOCK

WINNIPEG ELECTRIC COMPANY, Winnipeg, Canada, has received recently three Twin Coaches of the mechanical-drive, street car type, made by Twin Coach Corporation.

SAN DIEGO ELECTRIC RAILWAY, San Diego, Calif., has received its third street car type Twin Coach made by Twin Coach Corporation, Kent, Ohio.

HAZLETON AUTOBUS COMPANY, Hazleton, Pa., a subsidiary of the Lehigh Traction Company, has received from Mack Trucks, Inc., New York, N. Y., one Mack six-cylinder 29-passenger city-type bus.

WICHITA FALLS TRACTION COMPANY, Wichita Falls, Tex., operating the Wichita Falls Bus Company, has placed in service two Mack four-cylinder 25-passenger city-type buses.

MONTREAL TRAMWAYS, Montreal, Canada, has ordered 50 new cars costing about \$1,000,000, from the Canadian Car & Foundry Company.

ILLINOIS POWER & LIGHT CORPORATION, Chicago, Ill., has accepted delivery on one Mack six-cylinder 29-passenger parlor-car bus.

CHICAGO, SOUTH SHORE & SOUTH BEND RAILROAD, Michigan City, Ind., has received two 80-ton electric locomotives built by the Baldwin Locomotive works and the Westinghouse Electric & Manufacturing Company. The new engines, of 1,200 hp., are 39 ft. 4 in. long, and cost about \$56,000 each.

CITY OF OSLO, Norway, has placed an order for four more A.C.F. 198 in. wheelbase chassis. The fleet at Oslo now consists of 43 A.C.F. buses.

SHOPS AND BUILDINGS

CINCINNATI STREET RAILWAY, Cincinnati, Ohio, has put into service the Colerain Avenue substation, first of the nineteen stations to be completed in the new automatic power distribution sys-

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	March 20, 1928
Metals—New York	
Copper, electrolytic, cents per lb.	13.8125
Copper wire, cents per lb.	16.125
Lead, cents per lb.	6.00
Zinc, cents per lb.	6.00
Tin, Straits, cents per lb.	52.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	.....
Somerset mine run, Boston, net tons.	.....
Pittsburgh mine run, Pittsburgh, net tons.	.....
Franklin, Ill., screenings, Chicago, net tons	1.825
Central, Ill., screenings, Chicago, net tons	1.675
Kansas screenings, Kansas City, net tons.	2.125
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	5.30
Weatherproof wire base, N. Y., cents per lb.	16.50
Cement, Chicago net prices, without bags.	2.05
Linseed oil (5-bbl. lots), N. Y., cents per lb.	10.3
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.25
Turpentine (bbl. lots), N. Y., per gal.	\$0.655

tem now under construction. Power from this station will go to cars on five routes. All five stations are scheduled to go into service in July.

BRITISH COLUMBIA ELECTRIC RAILWAY, Vancouver, B. C., is reported to be planning to erect two substations at an estimated cost of \$70,000.

TRACK AND LINE

LOS ANGELES RAILWAY, Los Angeles, Cal., has under way a widening and grading program on Vermont Avenue between San Marino and Washington Streets. Grading will also be done on Mesa Drive from Vernon to 61st Street.

KANSAS CITY PUBLIC SERVICE COMPANY, Kansas City, Mo., has submitted its 1928 program for track improvement to the Kansas City park board and the director of public works. The program includes the reconstruction of the double tracks on Broadway between West Linwood Boulevard and Westport Road, the relaying of the double tracks on Prospect Avenue between 43rd and 47th Streets and a single track on Prospect Avenue between 48th and 75th Streets. Other double tracks to be relaid are on Twelfth Street between McGee Street and Euclid Avenue, Main Street between Pershing Road and 27th Street, McGee Street from Twelfth to Fifteenth Streets, Walnut Street between Twelfth and Thirteenth Streets and Jackson Avenue between Twelfth and Fifteenth Streets.

TRADE NOTES

E. D. GIBBS, who has served as advertising director of The National Cash Register Company, Dayton, Ohio, at three different periods, has resigned his position to engage in business for himself in New York City. He will serve a limited number of clients on work in connection with sales promotion, sales contests and advertising. His temporary New York address after March 15 will be 66 West 55th Street.

IDEAL COMMUTATOR DRESSER COMPANY, Sycamore, Ill., has opened a New

England office at 182 Purchase Street, Boston, Mass., and has appointed the following new sales representatives: C. B. Keck, 1565 Ryalmount Road, Cleveland Heights, Ohio; F. D. Lawrence Electric Company, Cincinnati, Ohio; O. T. Hall, 432 North Calvert Street, Baltimore, Md.; G. A. Brewer, New Haven, Conn.; and DeMoss-Fox & Company, Detroit, Mich.

ARMCO CULVERT MANUFACTURERS ASSOCIATION, Middletown, Ohio, has appointed as its municipal engineer Harry E. Cotton, formerly assistant city engineer at Omaha, Neb. His engineering experience is now at the service of all municipalities in the United States and Canada for assistance in the solution of problems involving drainage, subdrainage and flood control.

HENDRICK MANUFACTURING COMPANY, Carbondale, Pa., manufacturer of "Mitco" interlocked steel grating, stair treads and armorgrids, announces the opening of a Chicago district office, 223 Railway Exchange Building, Chicago, in charge of Lon Sloan.

GERARD SWOPE, president of the General Electric Company, has returned to this country after a trip abroad. He says England is definitely on the road to economic and industrial recovery and progress is everywhere evident.

ASBESTOS BRAKE LINING ASSOCIATION and the National Battery Manufacturers Association announce the removal of their offices to the Hale Building, 7 East 44 Street, New York, N. Y.

ADVERTISING LITERATURE

SILENT HOIST, WINCH & CRANE COMPANY, Brooklyn, N. Y., has issued a new bulletin, No. 27, on winches. The winches illustrated are suitable for either portable or stationary use and as car pullers.

SHERMAN CORPORATION, Boston, Mass., has published a report of a survey of industry, entitled, "What Is Happening to Business?" The report includes causes to which increase or decrease in net profits is attributed, and excerpts from interviews with representative business executives.

LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, has issued a new bulletin descriptive of the "Linc-Weld" motor.

GENERAL ELECTRIC COMPANY, Schenectady, N. Y., has issued bulletin GE A-828 describing the electrification of the Butte, Anaconda & Pacific Railway. Other bulletins issued are: GE A-872 on drum-type controllers for railway service; GE A-951 on Mazda C short-circuiting lamp and socket; GE A-137A on synchronous motors, types T.S. & Q.S.; GE A-914 on CR9441-LS 424A limit switch; GE A-797 on the repair of railway commutators; GE A-921 on better lubrication of railway motors; GE A-467A on automatic starters for slip ring motors; and GE A-808A on totally enclosed fan-cooled motors.

EVENTUALLY—

more electric railways will consider their hand brakes of greater importance than merely part of their car equipment!

More properties will insist and order the hand brake on each car be applied at least once during every trip. Greater safety is a recognized policy.

Before issuing such orders they will make sure that hand-brakes are in working condition and will stop their cars.

If equipped with "Peacock" Staffless Brakes, no matter how badly brake shoes are worn or how loose the rigging is, they are insured of adequate braking power.

With three times the braking capacity of ordinary hand brakes—up to 144 inches of chain-winding capacity—simplicity of operation—etc., cars equipped with "Peacock" Staffless Brakes are always ready for any emergency.

National Brake Company, Inc.

890 Ellicott Square

Buffalo, N. Y.

Canadian Representative:

Lyman Tube & Supply Co., Ltd., Montreal, Canada



Up!
Up!
Up!

His sales volume responded to INDUSTRIAL ADVERTISING

LISTEN to this story of a business that pulled itself up by its own boot straps, the story of a manufacturer who defied the trend of general business and gained sales volume regardless.

From a minor position to recognized leadership by steady yearly gains, always exceeding the progress of industry as a whole—that is what took place and how it was done is an open book.

It was a young business, making power plant supplies and small parts—sort of a line of industrial “notions”—just the type that might be thought too small to employ Industrial Advertising effectively. In the light of what happened, no one can tell this manufacturer that Industrial Advertising cannot be geared to a small business. That is just what he did—

Geared Industrial Advertising to His Business

At the outset the policy was established to specialize on worthwhile markets. The buyers' habits were studied intently and a complete plan of Industrial Advertising and Selling was built around their needs. The counsel of an experienced advertising agent was retained.

Thoughtful attention was devoted to the selection of industrial publications and the preparation of advertising copy. In team-work fashion both sales and advertising strategy were aimed at one thing—*Recognition by worthwhile buyers.*

This *Recognition* was found to be the straight line to larger sales volume. Tangible results were greater than a previous inquiry campaign had produced. A check of actual buyers against McGraw-Hill subscribers showed that 80% were on both lists.

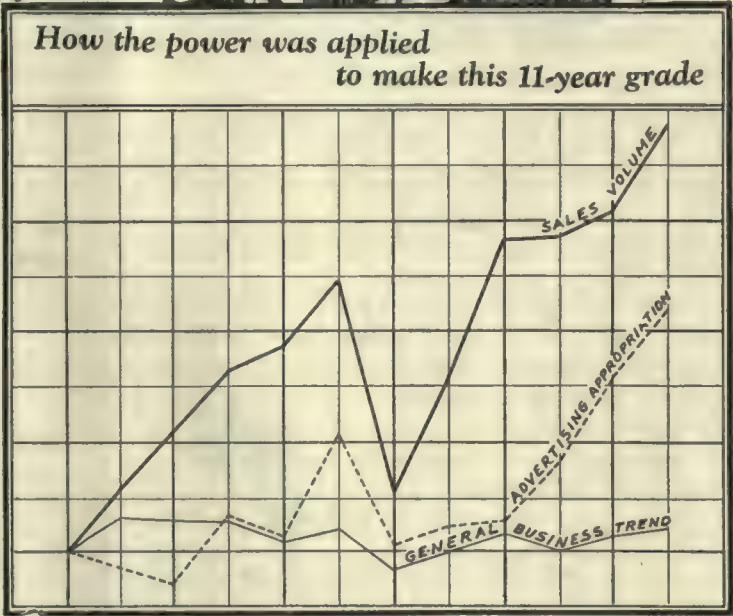
From each year's business came the wherewithal to produce next year's increase. Eight per cent of gross revenue appropriated for Industrial Advertising produced an average yearly gain in sales volume of nearly 30%. Only once did the manufacturer experiment with a reduced appropriation. And this was the only period when he experienced reduced sales. Comparing the three curves of the chart shows that this manufacturer's growth was controlled not so much by general business conditions as by his volume of Industrial Advertising.

His curve of *net profits* has closely paralleled the curves of gross sales and advertising for the past six years and is still ascending steadily.

Industrial Marketing at Work

After studying hundreds of such successful cases, McGraw-Hill prepared its new book, “Industrial Marketing at Work.” This book establishes *recognition* as the proper goal of Industrial Marketing and offers a practical method, in ten logical steps, for its accomplishment.

If your markets lie within any field of industry broader than your strictly local territory a McGraw-Hill representative will gladly discuss this study and present a copy to you or your advertising agency. For promptness, address your nearest McGraw-Hill office.



McGraw-Hill Publications

- | | | | |
|---|--|--|---|
| Electrical
ELECTRICAL MERCHANDISING
ELECTRICAL WORLD
ELECTRICAL WEST
•
Transportation
ELECTRIC RAILWAY JOURNAL
BUS TRANSPORTATION
•
Construction & Civil Engineering
ENGINEERING NEWS-RECORD
CONSTRUCTION METHODS | Mining
ENGINEERING & MINING JOURNAL
COAL AGE
•
Radio
RADIO RETAILING
•
Industrial
CHEMICAL & METALLURGICAL ENGINEERING
AMERICAN MACHINIST
(American and European Editions)
POWER | Affiliated Publications
(Published by McGraw-Shaw Company)
FACTORY AND INDUSTRIAL MANAGEMENT
INDUSTRIAL ENGINEERING
with which is consolidated
INDUSTRY ILLUSTRATED
•
(Published by
Business Publishers International Corporation)
INGENIERIA INTERNACIONAL
EL AUTOMOVIL AMERICANO
AMERICAN AUTOMOBILE | Catalogs and Directories
McGraw-Hill ELECTRICAL ENGINEERING CATALOG
McGraw-Hill ELECTRICAL TRADE CATALOG
KEYSTONE COAL MINING CATALOG
KEYSTONE METAL QUARRY CATALOG
KEYSTONE COAL BUYERS CATALOG
McGraw CENTRAL STATION DIRECTORY
McGraw ELECTRIC RAILWAY DIRECTORY
METAL QUARRY DIRECTORY
COAL FIELD DIRECTORY
BONBRIGHT SURVEY OF ELECTRIC POWER &
LIGHT COMPANIES IN THE U. S. |
|---|--|--|---|

WHERE THE ADVANCE OF ENGINEERING, PRODUCTION AND INDUSTRIAL ADVERTISING HAS BEEN RECORDED FOR HALF A CENTURY

"Ignorance is the cause of economic waste"

—said Mr. O. H. Cheney, Vice-President of the American Exchange-Pacific National Bank, New York City, in a recent address. "Ignorance of the facts of supply and demand is the cause of troubles which afflict the separate industries. Ignorance of efficient business methods is the cause of individual failure."

There is no need, today, for the individual business man to be in the dark about conditions and improved practice in his field. The business press particularly those publications belonging to the A.B.P., are serving industry better and more completely than ever before.

Fight waste with facts from A. B. P. papers

Get the most out of your business paper. Read its editorials for the worth-while

opinions of men who know. Read its technical articles to keep pace with current developments. Read its advertisements for dollar-saving suggestions.

You fight waste with facts when you get your information from an A.B.P. publication—this one, for example. High standards of accuracy in editorial as well as advertising content are exacted as a condition of membership in the Associated Business Papers, Inc.

Advertisers in A.B.P. papers are combating selling waste by reaching selected groups of readers who are searching for just such economical suggestions as the advertisers have to offer.

Are you making the most of this, your business paper?



Be a consistent reader of your paper. Each issue contains information that you would not want to miss.

THE ASSOCIATED BUSINESS PAPERS, Inc.
Executive Offices: 220 West 44th St., New York, N. Y.

A. B. P.

An Association of none but qualified publications reaching 54 fields of trade and industry.

Nuttall

and
Timken!



*Nuttall US 20A Trolley Base
Equipped with Timken Tapered Roller Bearings*

Two old-time names in which the public has a lot of confidence. Both companies make products in which the public has had a lot of confidence for a long time. Just try to imagine how many people are riding on Timken Bearings and under Nuttall Trolleys right today.

The Nuttall US 20A trolley base is equipped with Timken Swivel Bearings—and that settles the bearing question—the friction question.

It is also equipped with a system that settles the lubrication question—fill the reservoir about twice a year, and forget it.

It is equipped with 1000 Ampere Capacity Shunts and that settles the arcing question.

Now Nuttall settles another question—the price question.

Send for Bulletin No. 46

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

Nuttall



This big modern motor coach was built by the Versare Corporation of Albany, New York, for the Montreal Tramways Company and includes every practical passenger convenience to date.

Balsam-Wool Provides Comfort for Motor Coach Passengers

PEOPLE naturally seek the most pleasant mode of travel and many are turning to the rapidly increasing number of motor buses for suburban, interurban and long distance transportation.

To attract this trade the builders of motor coaches are giving a distinct consideration to comfort for passengers.

Not all motor buses are as big or expensive as that in the illustration but all can have the same quiet comfort, the same protection against winter cold and summer heat by insulating with Balsam-Wool.

Balsam-Wool provides the maximum of heat stoppage, assuring warmth and comfort to passengers.

It is light weight, flexible, tough and non-settling, highly fire-resistant, odorless and sanitary.

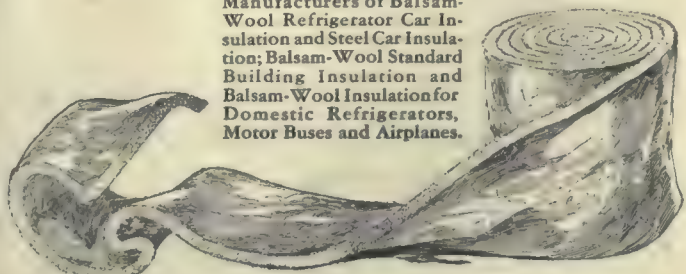
For motor coach manufacturers we have valuable facts regarding Balsam-Wool that will make your buses attractive to passengers the year round. We will gladly supply them together with samples of this effective insulation. Write today.

WOOD CONVERSION COMPANY

*Insulation Division of Weyerhaeuser Forest Products
Mills at Cloquet, Minnesota*

Industrial Sales Office: 360 N. Michigan Ave., Chicago, Ill.

Manufacturers of Balsam-Wool Refrigerator Car Insulation and Steel Car Insulation; Balsam-Wool Standard Building Insulation and Balsam-Wool Insulation for Domestic Refrigerators, Motor Buses and Airplanes.



Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

Design and Construction
Examinations Reports Appraisals
Industrial and Public Service Properties

NEW YORK BOSTON CHICAGO

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys
Better Service—Financial Reports
Appraisals—Management

52 Vanderbilt Ave.

New York

SANDERSON & PORTER ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Design Construction Management
Examinations Reports Valuations

CHICAGO NEW YORK SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineers

Appraisals Reports Rates Service Investigation
Studies on Financial and Physical Rehabilitation
Reorganization Operation Management

683 Atlantic Ave., BOSTON, MASS.

ALBERT S. RICHEY ELECTRIC RAILWAY ENGINEER WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

J. ROWLAND BIBBINS

Engineer—2301 Connecticut Ave., N.W., Washington, D. C.

TRANSPORTATION SURVEYS

Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City
Plans, Service, Routing, Valuation, Economic Studies

EXPERIENCE IN 20 CITIES

C. B. BUCHANAN President W. H. PRICE, JR. Sec'y-Treas. JOHN F. LAYNG Vice-President
BUCHANAN & LAYNG CORPORATION
Engineering and Management, Construction
Financial Reports, Traffic Surveys
and Equipment Maintenance
BALTIMORE 1004 Citizens National Bank Bldg. Phone: NEW YORK 49 Wall Street
Hanover: 2142

DAY & ZIMMERMANN, Inc. ENGINEERS

DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction
43 Cedar Street, New York City

STEVENS & WOOD

INCORPORATED

ENGINEERS AND CONSTRUCTORS

120 BROADWAY, NEW YORK

ENGINEERING
CONSTRUCTION

YOUNGSTOWN, O.
CHICAGO, ILL.

FINANCING
MANAGEMENT

KELKER, DeLEUW & CO.

CONSULTING ENGINEERS

REPORTS ON

Operating Problems Valuations Traffic Surveys

111 W. Washington Street, Chicago, Ill.

McCLELLAN & JUNKERSFELD

Incorporated

ENGINEERING AND CONSTRUCTION

Examinations—Reports—Valuations

Transportation Problems—Power Developments

68 Trinity Place, New York

Chicago

St. Louis

E. H. FAILE & CO.

Designers of

Garages—Service Buildings—Terminals

441 LEXINGTON AVE.

NEW YORK

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly and Sunday Pass—Differential

Fares—Ride Selling

Holbrook Hall 5-W-3

160 Gramatan Ave., Mt. Vernon, N. Y.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of
Water Tube Boilers
of continuing reliability



WORKS
Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893

BRANCH OFFICES

ATLANTA, Candler Building
BOSTON, 80 Federal Street
CHICAGO, Marquette Building
CINCINNATI, Traction Building
CLEVELAND, Guardian Building
DALLAS, TEXAS, Magnolia Building
DENVER, 444 Seventeenth Street
DETROIT, Ford Building
HOUSTON, TEXAS, Electric Building
LOS ANGELES, Central Building
NEW ORLEANS, 344 Camp Street

BRANCH OFFICES

PHILADELPHIA, Packard Building
PHOENIX, ARIZ., Heard Building
PITTSBURGH, Farmers Deposit Bank Building
PORTLAND, ORE., Failing Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Building
SEATTLE, L. C. Smith Building
HONOLULU, T. H., Castle & Cooke Building
HAVANA, CUBA, Calle de Aguilar 104
SAN JUAN, PORTO RICO, Royal Bank Building

THE P. EDWARD WISH SERVICE

57 Church St. NEW YORK
Street Railway Inspection DETECTIVES
131 State St. BOSTON

TRAFFIC CONSULTANT

Freight Rate, Tariff and Traffic Analyses;
Advisory Freight Traffic Assistance
on Special or Monthly Basis;
Preparation of Cases before Interstate Commerce
Commission and State Commissions.

HALSEY McGOVERN

Mills Bldg., 17th and Pa. Ave., Washington, D. C.

When writing the advertiser for information or
prices, a mention of the Electric Railway
Journal would be appreciated.



NACHOD & UNITED STATES SIGNAL CO., INC.

LOUISVILLE, KY.

BLOCK SIGNALS

FOR

ELECTRIC RAILWAYS
HIGHWAY CROSSING SIGNALS



UNA

RAIL JOINTS

DYNAMOTORS
WELDING ROD

UNA Welding & Bonding Co.
Cleveland, Ohio.



CHILLINGWORTH

One-Piece Gear Cases

Seamless—Rivetless—Light Weight
Best for Service—Durability and
Economy. Write Us.

Chillingworth Mfg. Co.
Jersey City, N. J.

GOLD CAR HEATING & LIGHTING CO.

220 36th St., Brooklyn, N. Y.

ELECTRIC HEATERS WITH OPEN COIL OR
THERMOSTAT CONTROL—VENTILATORS
ENCLOSED ELEMENTS

WRITE FOR NEW CATALOGUE

BELL CEDAR POLES

NORTHERN

WESTERN

BUTT TREATING
ALL GRADES

TIES

BELL LUMBER CO., Minneapolis, Minn.



STUCKI SIDE BEARINGS

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

CREOSOTED

Railroad Cross-ties; Switch-ties; Bridge Timbers;
Construction Timbers; Mine Timbers;
Lumber; Piling; Poles; Posts and other
Forest Products

J.F. Prettyman & Sons
Wood Preserving Plant
Charleston, S. C.



Efficient Bus Heating
with

The N-L Venti-Duct Heater

THE NICHOLS-LINTERN CO.
7960 Lorain Ave. Cleveland, Ohio

HASKELITE ROOFS

Haskelite Manufacturing Corporation.
133 West Washington Street, Chicago

PLYMETL SIDE PANELS



He is your business partner

He considers first and foremost your interests.

He is truthful and honest in his dealings with you.

He is not provincial, but his experience is nation-wide in scope.

He is not opinionated, but brings to you unbiased facts, news, and reports.

He has a finger on the pulse of your trade's activities. He promulgates helpful information.

He is in close touch with manufacturers, producers, distributors—those from whom you buy.

He deals with none which has a tendency to mislead or which does not conform to business integrity.

He is a consultant that "sits in" with you regularly. His suggestions are profitable to you.

He holds a fellowship in a select association with exacting standards of membership.

He has pledged himself to determine the highest and largest function of the trade which he serves, and to strive in every legitimate way to promote that function.

HE IS THIS PAPER.

Your paper. A member of the Associated Business Papers, Inc.

A. B. P.

THE ASSOCIATED BUSINESS PAPERS, Inc.

Executive Offices: 220 West 42nd St., New York, N.Y.

The A.B.P. comprises a group of business papers that reaches 54 fields of trade and industry. Membership requires the highest standards in every department of publishing, circulation, editorial, and advertising.

The advertisers in this publication demonstrate by their presence here that they are awake to modern methods of selling as well as production—methods that cut costs and standardize operations.



COLUMBIA

Railway Supplies and Equipment

Machine and
Sheet Metal Work

Forgings
Special Machinery
and Patterns

Grey Iron and
Brass Castings

Armature and
Field Coils.

The Columbia Machine Works and M. I. Co.
265 Chestnut St., corner Atlantic Ave.,
Brooklyn, New York



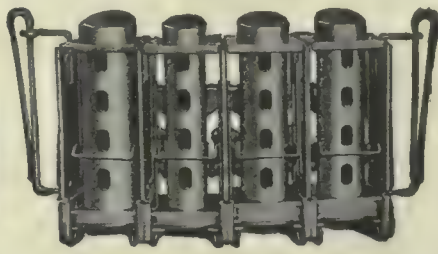
JOHNSON FARE COLLECTING SYSTEMS



Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates. It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.



Johnson Fare Box Co.
4619 Ravenswood Ave., Chicago, Ill.

Griffin Wheel Company
410 North Michigan Ave.
Chicago, Ill.

Griffin Wheels
with
Chilled Rims
and
Chilled Back of Flanges
For Street and Interurban
Railways

FOUNDRIES:

- | | | |
|-----------|----------------|-------------|
| Chicago | Boston | St. Paul |
| Detroit | Kansas City | Los Angeles |
| Denver | Council Bluffs | Tacoma |
| Cleveland | Salt Lake City | Cincinnati |

Greater Service Per Dollar Invested



"Tiger" Bronze Axle and Armature Bearings

More-Jones "Tiger" Bronze castings for axle and armature bearing service was one of our early achievements. This is probably the most widely known bronze on the market. It has stood the test of time. There is nothing better for long, efficient and most economical results. Let us quote you.

**National Bearing Metals
Corporation**
New York, N. Y.
Jersey City, N. J.
Pittsburgh, Pa.
Meadville, Pa.
St. Louis, Mo.
Portsmouth, Va.

**MORE-JONES
QUALITY PRODUCTS**

STANDARD STEEL PRODUCTS



**Steel Axles Steel Springs
Armature Shafts
Rolled Steel Wheels**

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES

CHICAGO NEW YORK PORTLAND SAN FRANCISCO ST. LOUIS
PITTSBURGH HOUSTON RICHMOND ST. PAUL MEXICO CITY
WORKS: BURNHAM, PA.

TISCO MANGANESE STEEL SPECIAL TRACKWORK

Wharton Tisco Manganese Steel Trackwork
will help you hold the up-keep down.

WM. WHARTON JR. & CO., INC.
Easton, Penna.

B. A. HEGEMAN, Jr. President H. A. HEGEMAN, First Vice-Pres. and Treas.
F. T. SARGENT, Secretary J. M. PRATT, Vice-Pres. in charge of sales

National Railway Appliance Co.

Graybar Building, 420 Lexington Ave., New York

BRANCH OFFICES

Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago, Ill.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Anglo-American Varnish Co.,
Varnishes, Enamels, etc.
National Hand Holds
Genesco Paint Oils
Dunham Hopper Door Device
Garland Ventilators
Walter Tractor Snow Plows
Feasible Drop Brake Staffs
Ft. Pitt Spring & Mfg. Co.,
Springs

Flaxlinum Insulation
Economy Electric Devices Co.
Power Saving and Inspection
Meters
National Safety Devices Com-
pany's Whistle Blowers,
Gong Ringers and Brake
Hangers
Godward Gas Generators
Cowdry Automotive Brake
Testing Machine



FARE BOXES for BUSES

Let us tell you of this especially de-
signed box for this class of service.

The Cleveland Fare Box Co.
4900 Lexington Ave., Cleveland, O.
Canadian Cleveland Fare Box Co., Ltd.
Preston, Ontario

COIN COUNTING And Sorting Machines CHANGES CARRIERS Tokens

Bethlehem Products for Electric Railways

Tee and Girder Rails; Machine Fitted Joints;
Splice Bars; Hard Center Frogs; Hard Center
Mates; Rolled Alloy Steel Crossings; Abbott and
Center Rib Base Plates; Rolled Steel Wheels and
Forged Axles; Tie Rods; Bolts; Tie Plates and
Pole Line Material.

Catalog Sent on Request

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

BETHLEHEM

Used and Surplus Equipment

INDIVIDUAL items of used
equipment, or surplus new equip-
ment, or complete plants, are dis-
posed of (and found) through adver-
tising in the *Searchlight* Section of this
paper.

This is the section which so effectively aided the Government in
selling the many millions of dollars worth of surplus material and
equipment accumulated during the war without disturbing the
market.

"SEARCHLIGHT"

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 3 cents a word, minimum 75 cents an insertion, payable in advance.
Positions Vacant and all other classifications, 8 cents a word, minimum charge \$2.00.
Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....\$4.50 an inch
 4 to 7 inches..... 4.30 an inch
 8 to 14 inches..... 4.10 an inch
 Rates for larger spaces, or yearly rates, on request.
 An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

POSITIONS WANTED

TRACK superintendent. Associate Member American Society Civil Engineers. Qualified by technical training and over 15 years' practical street railway track experience. Full charge as superintendent in field of over 300 men, steam shovels, concrete mixers, welding, grinding and acetylene outfits. With one of the largest street railways 15 years. Successful handling men and work. Now employed. PW-97, Electric Railway Journal, Tenth Ave. at 36th St., New York.

GENERAL superintendent or manager; successful; seeks connection with a future. PW-77, Electric Railway Journal, Tenth Ave. at 36th St., New York.

MASTER mechanic with 17 years' experience city and interurban cars, buses, automobiles and building maintenance. Electrical engineering graduate. PW-100, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation, broad experience, successful record, wishes to correspond with managers needing services of a successful transportation man. Twenty years' experience city and interurban railways and buses; exceptional ability dealing with labor, public, increasing revenue, decreasing operating costs. High grade references. PW-92, Electric Railway Journal, 1600 Arch St., Philadelphia, Pa.

SUPERINTENDENT transportation; well known in electric railway field, with broad experience, successful record city, interurban railways and buses, available short notice, correspondence invited. Fine references. PW-94, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

WANTED—Position as manager, general superintendent or M. M. of electric railways. Can qualify in every way. PW-99, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

We Buy Railway Equipment

Equipment WANTED

Immediately

CARS

20—All steel or semi-steel Interurban Cars, with or without electrical equipment.

4—All-steel or semi-steel express cars.

LOCOMOTIVES

5—Electric Locomotives 15 to 50 ton.

MOTORS

20—G. E. 20-A, or G. E. 203-P.

10—G. E. 205.

24—G. E. 264.

18—W. H. 306-CV-4.

48—W. H. 508-A.

100—G. E. 247.

.. Anything from a single item to a complete Railway!

HIGHEST SPOT CASH PRICES PAID!

Why sell your surplus railway equipment at scrap prices when we will give you resale value prices? As national railway liquidation specialists we are ready to pay you highest cash prices and take the equipment off your hands immediately. We are prepared to do our own dismantling, quickly and efficiently. Send your list of equipment you wish to dispose of, for our quotations.

Write for complete descriptive circular showing modern railway equipment for sale.

The IRVING S. VAN LOAN CORP.

1819 Broadway

(Columbus Circle)

New York City

New Telephones: Columbus 1257-1258

TO HELP YOU

RENT, LEASE, OR EXCHANGE EQUIPMENT

"Searchlight" Advertising

Railway Motors Wanted

120—Railway Motors, 35-40 hp., to be mounted on Brill K-51-E truck fitted with 5-in. axle and 26-in. wheel

Address:

A. H. STOCK

2276 Franklin Avenue, Toledo, Ohio

**We buy entire
Railways and
Power Plants**

**H. E. SALZBERG
COMPANY, Inc.**

225 Broadway

New York City

**We sell
Street Railway
and Power
equipment**

Don't Say, "It's not worth anything"

THAT surplus Railway Equipment you consider of no value can be turned into cash! The fact that it's of no further value to you doesn't mean that it is not of value to somebody else. There's always a market for used railway equipment. Reach the greatest number of prospective buyers for the surplus Railway Equipment you have at a minimum cost, thru an advertisement in the—

SEARCHLIGHT SECTION

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Advertising, Street Car
Collier, Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Traction
Brake Co.

Anchors, Guy
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Works
Elec. Service Supplies Co.

Automatic Return Switch
Stands
Ramapo Ajax Corp.

Automatic Safety Switch
Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Westinghouse E. & M. Co.

Babbitting Devices
Columbia Machine Works

Babbit Metal
National Bearing Metals
Corp.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.,
The

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
National Bearing Metal
Corp.

Westinghouse E. & M. Co.

Bearings, Center and Roller
Side
Cincinnati Car Co.
Columbia Machine Works
Stucki Co., A.

Bells and Buzzers
Consolidated Car Heating
Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Elec. Service Supplies Co.

Benders, Rail
Railway Trackwork Co.

Body Material, Haskellite
Plymet
Haskellite Mfg. Corp.

Bodies, Bus
Brill Co., The J. G.

Boilers
Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

Bonding Apparatus
American Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms
(See also Poles, Ties,
Posts, etc.)

Bates Expanded Steel
Truss Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
American Brake Shoe &
Foundry Co.

Bemis Car Truck Co.
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Versare Corp.

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Columbia Machine Works

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Cables)

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Irvington Varnish & Ins
Co.

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Foundry Co.
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Bemis Car Truck Co.
Columbia Machine Works
Standard Steel Works

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Foundry Co.
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Columbia Machine Works

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Work)

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(Continued on page 32)

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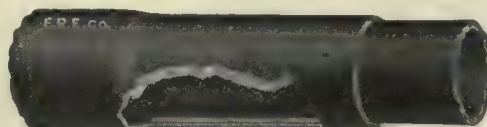
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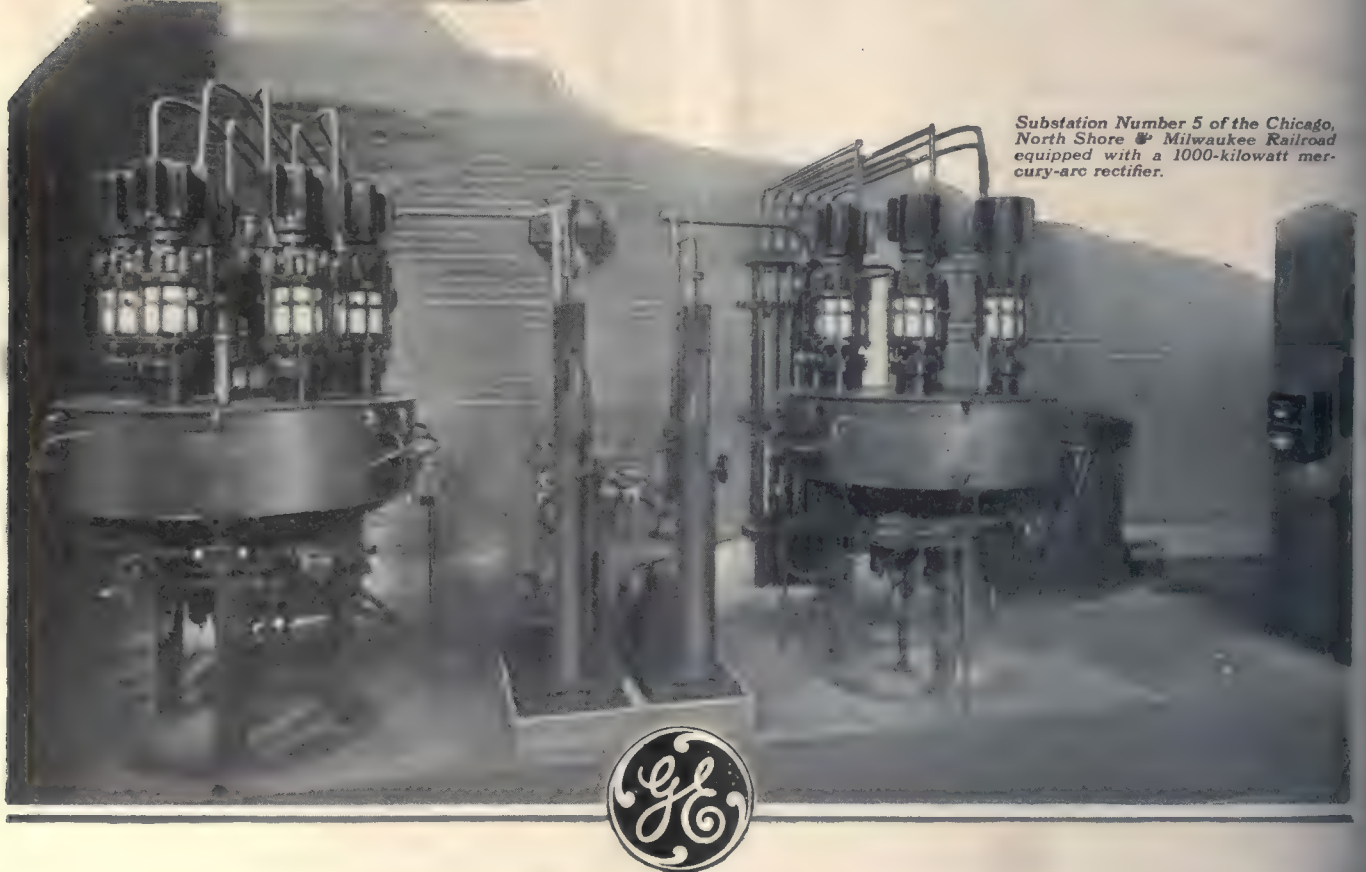
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During a year and a half of operation on the Chicago, North Shore and Milwaukee Railroad, General Electric mercury-arc rectifiers proved eight per cent more efficient than synchronous converters in the same service.

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Hill Publishing Company, Inc.

MARCH 31, 1928

Twenty Cents Per Copy

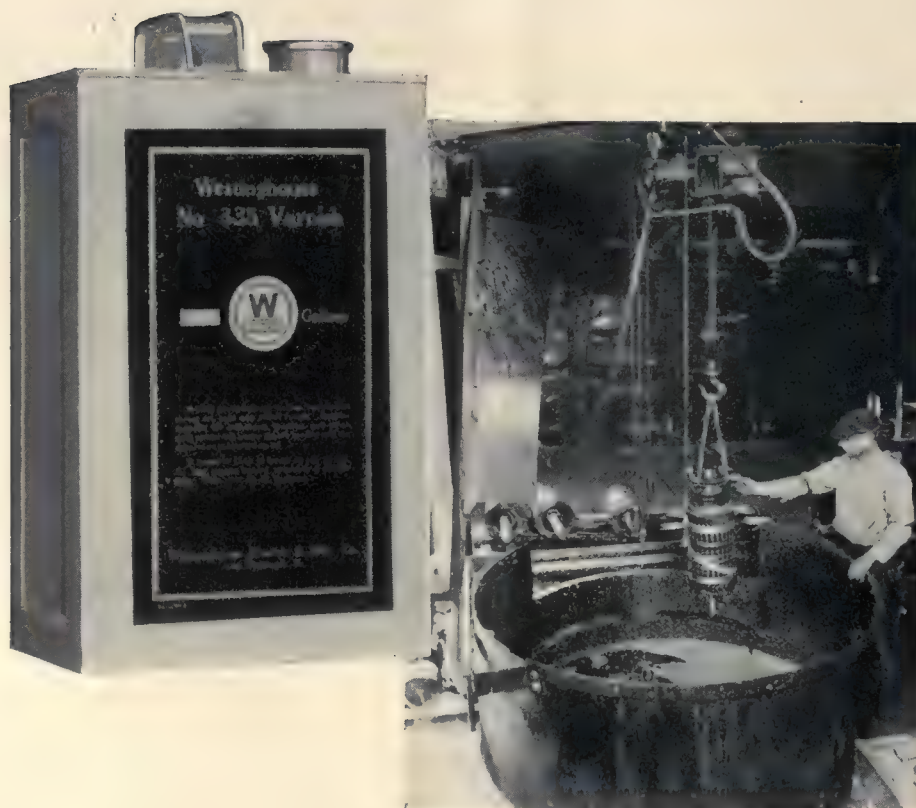


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No. 13

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The Far-Flung Influence of the Printed Word

MOST readers of the JOURNAL may not be aware of the widespread public attention which is given to articles appearing in the pages of their business paper. The JOURNAL's coverage of the local transportation industry, not only in America but throughout the world, has been a feature of this paper's service that is generally understood among both its subscribers and contributors. But the far-flung influence outside the industry of an article in the JOURNAL and the momentum of the printed word may not be so generally known. The story of a single recent article may prove of interest.

In the February 4, 1928, issue of the JOURNAL there was published an article by E. J. McIlraith on the effects of parking prohibition in Chicago's central business district. On the sixth, a leading New York newspaper, realizing the news interest in this article, quoted from it in its columns. Articles or editorials subsequently appeared in other cities, among which were Jamestown, Zanesville, Ohio, Buffalo, Detroit, Baltimore, Ann Arbor, Rochester, Superior, Wis., Perth Amboy, Anniston, Ala., and Birmingham, Mich. Doubtless there were many more which did not come to the JOURNAL's attention. It is impossible to predict how far or how long discussion of this single article will extend in the public press. But experience indicates that it is not unusual for an item like this to receive attention for several months, and to reach into the most out-of-the-way corners of the country.

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**Why
Not
Invest**

**In A
Sure
Thing**

Dayton Tie Track

If Dayton Tie Track cost twice as much as ordinary track the investment might look too big, even considering its long life.

But, due to economies in concrete, etc., it actually costs less—it has been laid for \$8 per lineal foot—including tearing up of old pavement, rails, concrete, ties, and relaying new pavement.

The scientific construction of the Tie makes it immune to forces which ordinarily destroy track.

We can *show* you Dayton Tie Track is a sure thing.

The Dayton Mechanical Tie Co.
DAYTON, OHIO

DOLLARS AND SENSE!



O-B Headlights Give Speed, Safety -and Savings

Type DCP



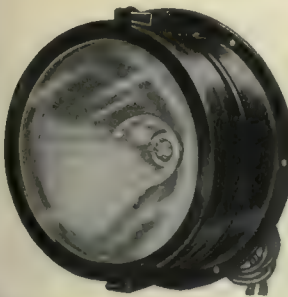
Portable high-speed interurban type, 500-watt lamp in mogul base; 11-in. dia. crystal ray glass or nickel plated copper reflector; maximum incandescent illumination. Also furnished with medium screw base. Has Two-way focusing mechanism. Page 755 of O-B Catalog No. 20.

Type LAA

Portable, luminous arc type headlight for high-speed interurban service. Illuminates track far enough ahead to permit safe braking of car at sixty miles per hour. Arc will hold when voltage has fallen to 50% of normal. Has incandescent dimmer lights. Clear inverted semaphore lens. Page 754 of O-B Catalog No. 20.



Type SDS



An incandescent headlight for ordinary interurban service. Mounts without cutting a hole in dash. 12-in. parabolic reflector of Crystal Ray glass, Gold Ray glass or of Sterling Ray nickel on copper, as desired. Accommodates any 56 to 250-watt, 105-130-volt focus type Mazda headlight lamp in adjustable lamp receptacle. Also furnished in portable type SDP. Page 755 of O-B Catalog No. 20.

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AMERICAN STEEL FOUNDRIES

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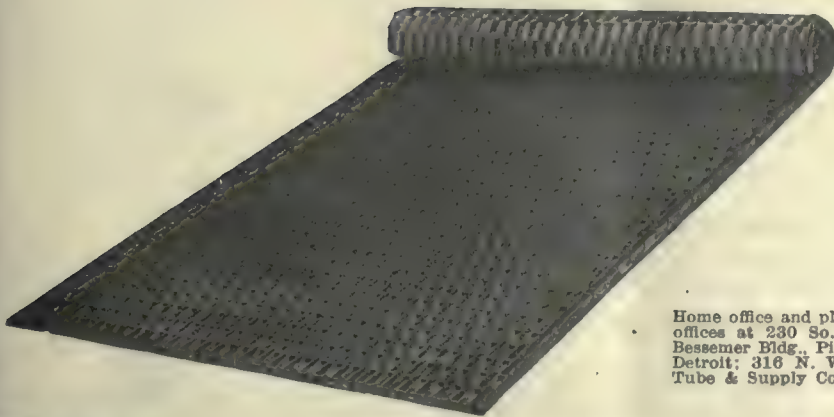
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OF THE WELL-EQUIPPED
CAR]

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WEAR-PROOF MATS

Add attractiveness and safety to your car interiors by covering the aisles with Wear-Proof Mats.

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T



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- 2** Reduced Delays . . . short stops permit cars to keep abreast of the traffic stream.
- 3** Faster Schedules . . . uniformly quick stops permit longer peak speed operation.

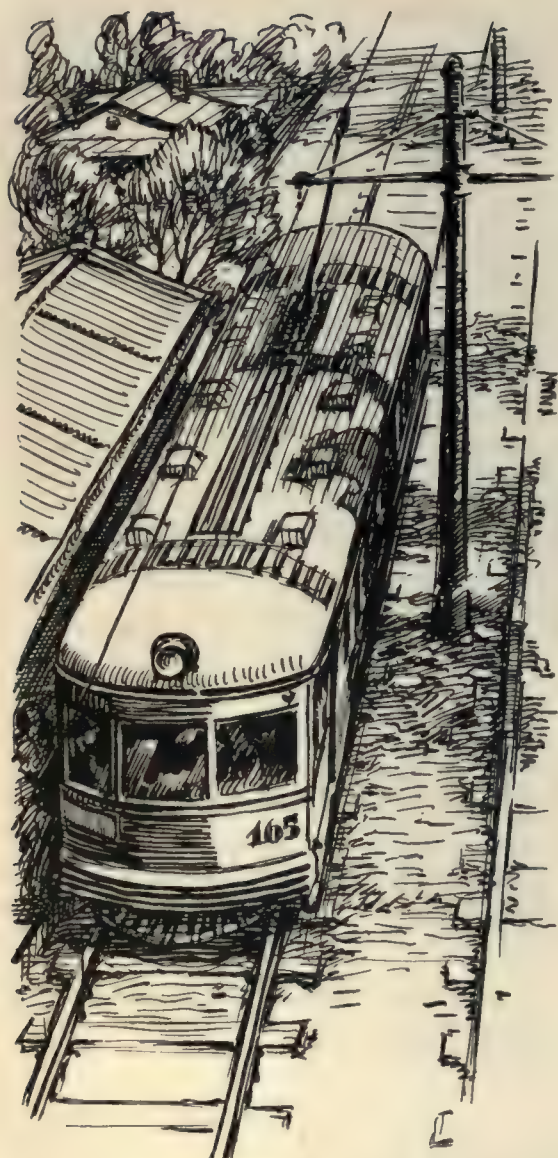


The illustration shows one of the fifty cars recently put into service by the Worcester Consolidated Street Railway—they are all equipped with the Westinghouse Variable Load Brake.

The Westinghouse Variable Load Brake automatically adjusts brake cylinder pressure as car weight changes—permitting maximum retarding rate throughout range of passenger loading.

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General Office and Works, Wilmerding, Pa.

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*Armature
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Springs*

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IN EVERY
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STYLES IN TRACK CONSTRUCTION

7

This is No. 7 of a series on paved track design with STEEL TWIN TIES as used in over 45% of the cities of over 200,000 population in the United States. No. 8 will appear in an early issue.

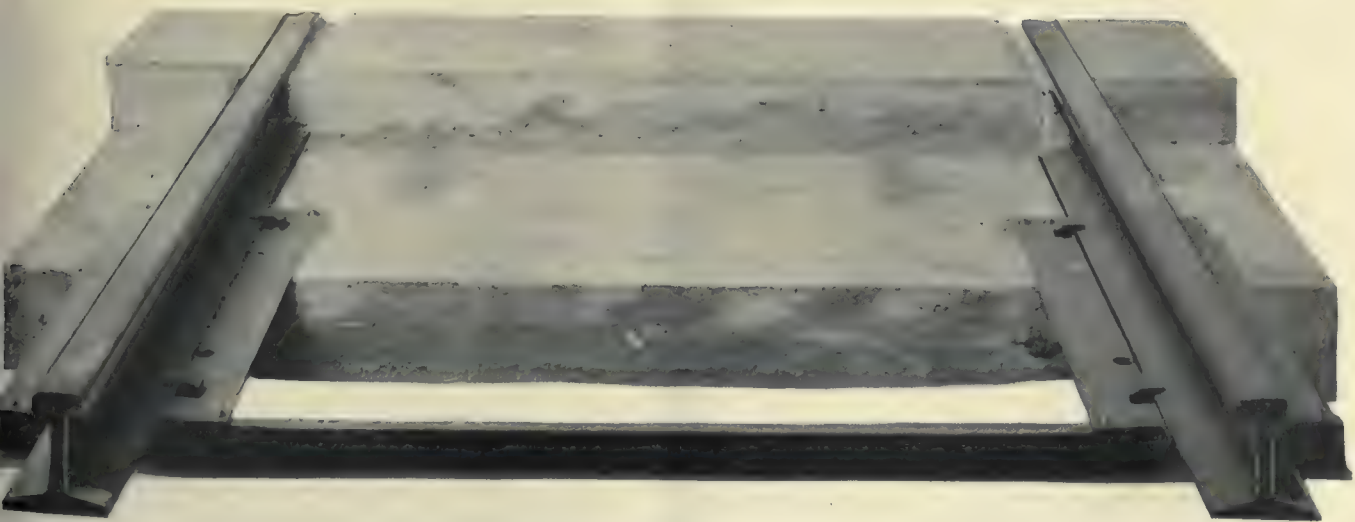
WASHINGTON



TODAY

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- No. 2 Boston
- No. 3 Detroit
- No. 4 Philadelphia
- No. 5 Kansas City
- No. 6 Cleveland
- No. 7 Washington
- No. 8 Buffalo

ESTERDAY

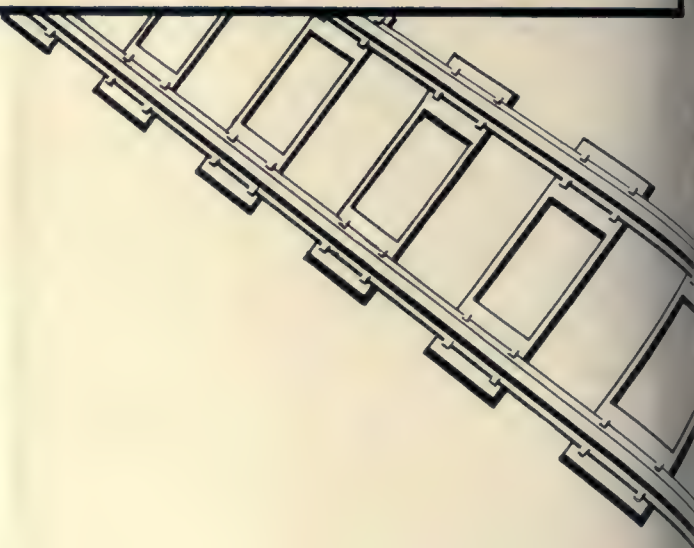
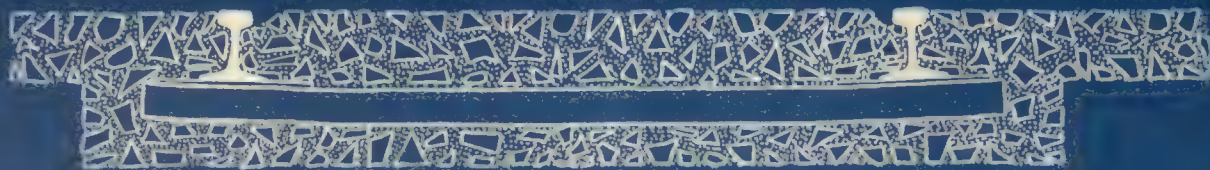


STEEL TWIN TIE TRACK

THE BASE OF MODERNIZATION



In Washington



STEEL TWIN TIES are furnished for the Washington Railway and Electric Company with the ends bent upward 1 in 25 to cant the rail and are punched for 100 lb. AEREA rail, for all their overhead trolley construction. The rails are Thermit welded and the track is paved with concrete laid monolithic with the foundation.

Complete detailed drawings and specifications will be sent on request.

Engineers of The International Steel Tie Company have played no small part in the design of better, more lasting track. We have in our files a fund of data on paved track construction that is at your disposal. We will be pleased to discuss with you your paved track problems, and to help you start your modernization program right. Steel Twin Ties are the first step toward better service, and lower initial and maintenance costs.

The International Steel Tie Co.
Cleveland, Ohio



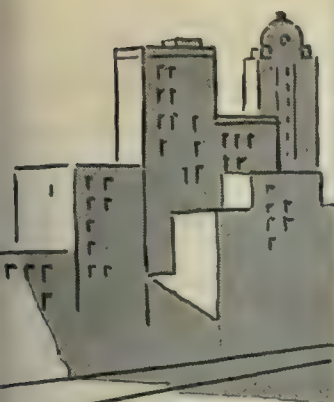
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A modern street car is safer than
your own car and saves the time
and trouble that you spend in
parking.

SAFE-QUICK-COMFORTABLE



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plays a part in

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by adding to the Safety, Speed
and Comfort of the Modern Car

CONSTANTLY



BETTER

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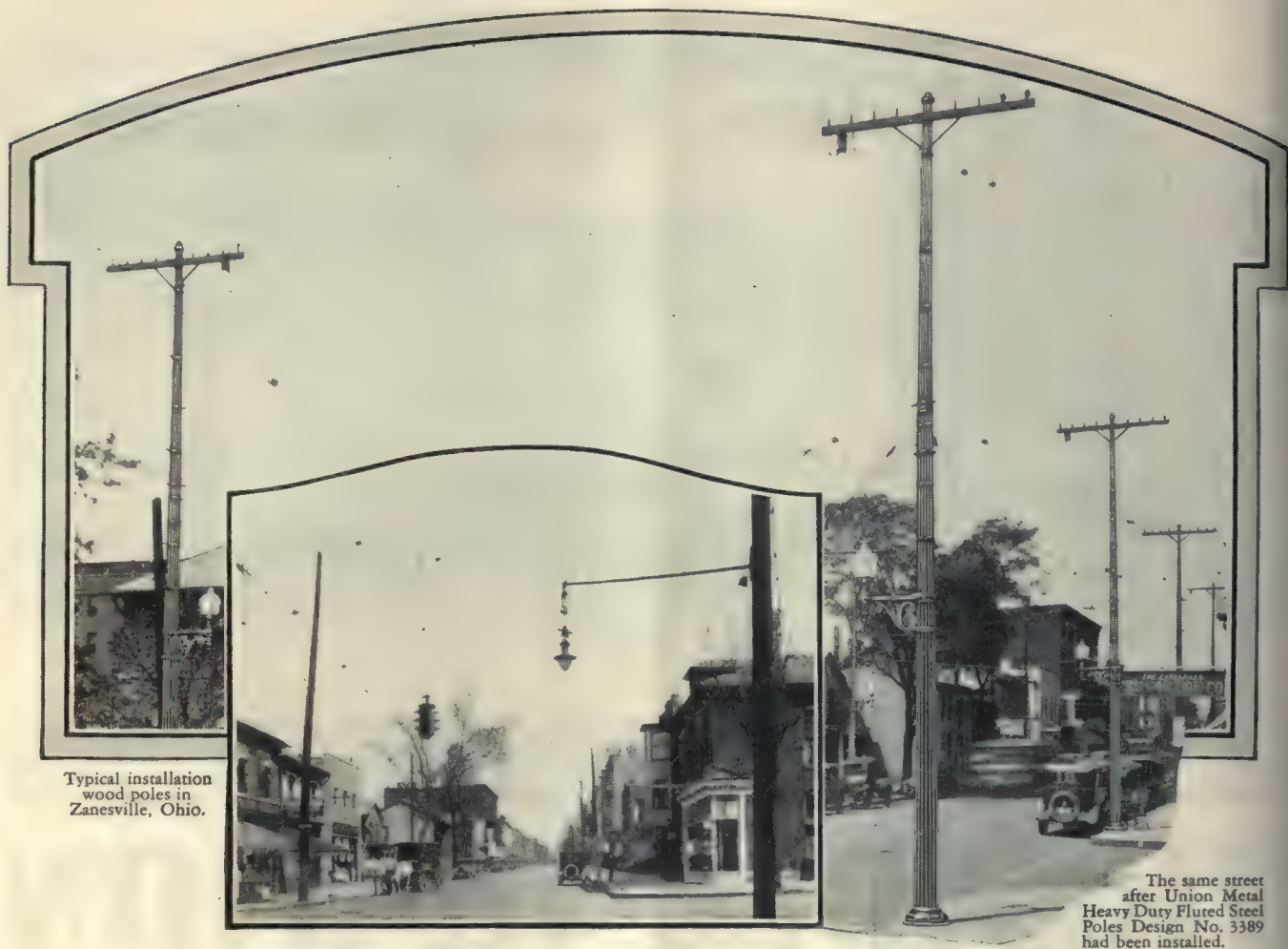
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poles of varying size, clean cut, artistic Union Metal poles extend in straight lines down the street, adding much to the dignity of the thoroughfare.

Zanesville is reaping the benefits of Union Metal advantages: the low installation and maintenance costs, the ease and speed of replacement, proper ventilation, the anchor rod construction and the unusual strength and durability.

Many other cities are having the same experience. Write for detailed information and see how Union Metal poles can be adapted to your own local requirements.

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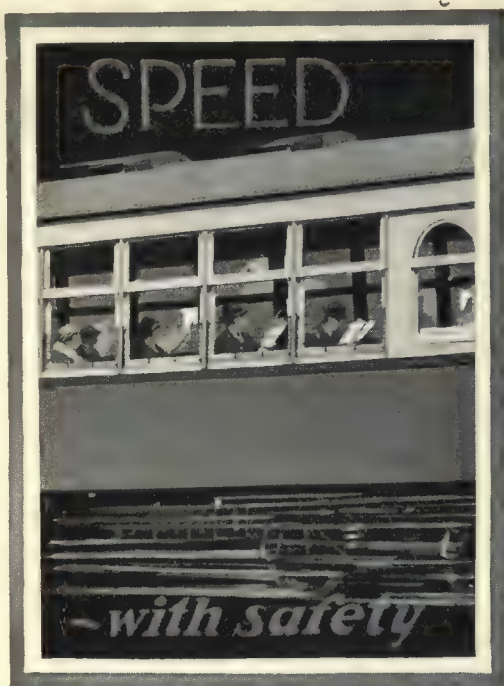
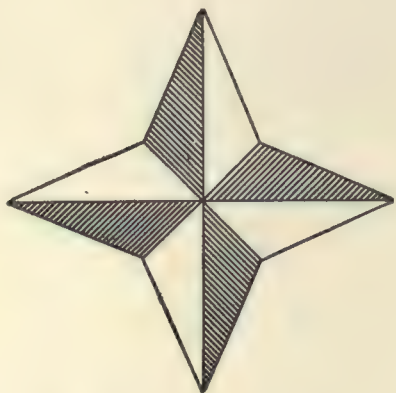
The Q.C.F. operator has the coaches to get the business, and to increase it, by handling it right.

More passenger miles, as well as low cost per mile, are required for maximum return.

Q.C.F. coaches are qualifying in critical service, under the same strict cost-keeping applied to any other type of revenue-transportation equipment!

AMERICAN CAR AND FOUNDRY MOTORS COMPANY
30 Church Street, New York

ac f 



When fact with you

The acid test of decided opinions—particularly opinions that have to do with railway operation is a period of shoulder rubbing with hard-pan fact. And there are decided advantages to be gained through frequently taking decided opinions out for an airing.

Particularly is this true of opinions that bear upon the relation of car design to the sale of transportation. A six months' old opinion on this subject is due for some fact propelled revision. Operating executives have been making decisions—putting opinions into actual operation. They are selling transportation and are getting more buyers with Cincinnati BALANCED Lightweight Cars.

"Speed with Safety," "Capacity with Comfort," "Beauty at Low

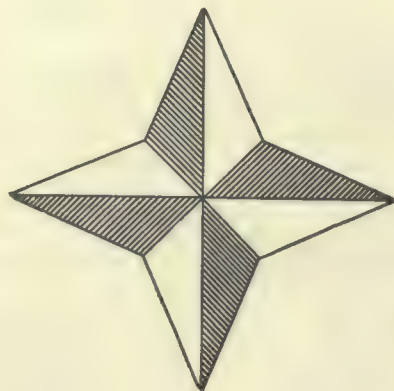
CINCINNATI **BALANCED
LIGHTWEIGHT** **CARS**

ck horns pinions


Cost" and "Light Weight With Strength" are accomplished facts finding expression in the design and construction of Cincinnati BALANCED Lightweight Cars. They are reducing costs and boosting revenue wherever they serve the public. And while they are accomplishing this they are establishing, too, new and higher standards of comfort in the minds of the public.

Your decided opinions on the relation of car design to the sale of transportation cannot suffer through an intimate acquaintance with the Four Features as presented by the Cincinnati Car Company. How soon will it be convenient for you to talk things over?

CINCINNATI CAR COMPANY
Cincinnati, Ohio



CINCINNATI **BALANCED
LIGHTWEIGHT** CARS



From Tampa up to Winnipeg from Maine to California...

Engineers endorse this remarkable improvement

IN Carey Elastite System of Track Insulation, leading traction engineers everywhere have found the logical, unfailing means of reducing track noises.

This remarkable system of insulation consists of an asphaltic compound substantially reinforced with asphalt-saturated fibre preformed under heavy pressure. It is not affected by temperature or moisture changes, and it will outlive the track itself.

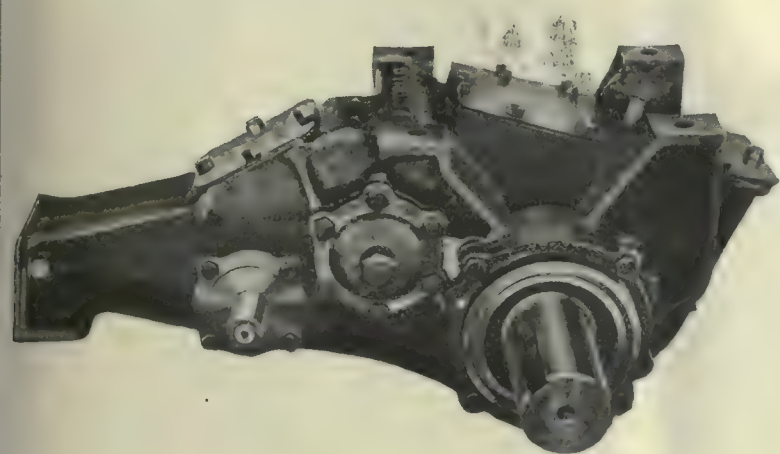
From a mere three hundred feet of track insulation used at West Alexander, Ohio, to more than one million lineal feet at Cincinnati, electric railways in more than 150 cities, large and small, are being given this lasting protection. Of course you will want to know more about Carey Elastite System of Track Insulation—why so many leading engineers endorse it so emphatically. Write.

THE PHILIP CAREY CO.
Lockland, Cincinnati, Ohio

Carey Elastite
TRADE MARK REG'D. U.S. PATENT OFFICE

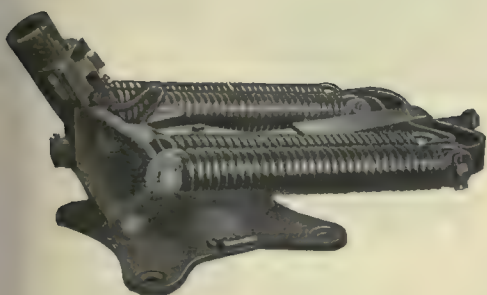
**SYSTEM OF
TRACK INSULATION**

The Public must be pleased!



With the new conception of the electric car as the most popular of public transportation agencies, car designers have stressed safety, comfort and appearance. The public must be pleased. Satisfied passengers will pay for your equipment.

The W-N Drive (a Westinghouse-Nuttall development) for use with light-weight, high-speed motors has already attracted wide and favorable interest. The industry has been quick to sense its advantages to themselves and to the riding public—smoother starting, quiet operation, rapid acceleration and greater all-round efficiency. Here are some features of the popularity of the new W-N Drive: Heat-treated hardened helical gears, Timken roller bearings, Oil-tight steel gear case, high ratio of speed reduction.



If you want to wear the smile of *genuine satisfaction*, and see that smile on every conductor's face—on every face around the car barn, here's a sure fire prescription:

Put on some Nuttall US 20-A Trolley bases. Timken Tapered Roller Bearings insure durability and sensitiveness, permitting the trolley to swivel freely and instantly follow changes in trolley wire alignment.

The design is such that the base actually hangs on the bearings and not on the center pin; "cocking" strains are evenly distributed; all wearing parts are hardened; and lubrication is taken care of by a twice a year oiling system. Heavy shunts conduct the current around bearings and moving parts, so you can forget arcing troubles.



Gear noise has a definite effect on passenger good will. People do not enjoy riding on cars on which the gears screech and grumble as if in agony. Why put their good will to the test of screeching gears? It's unnecessary.

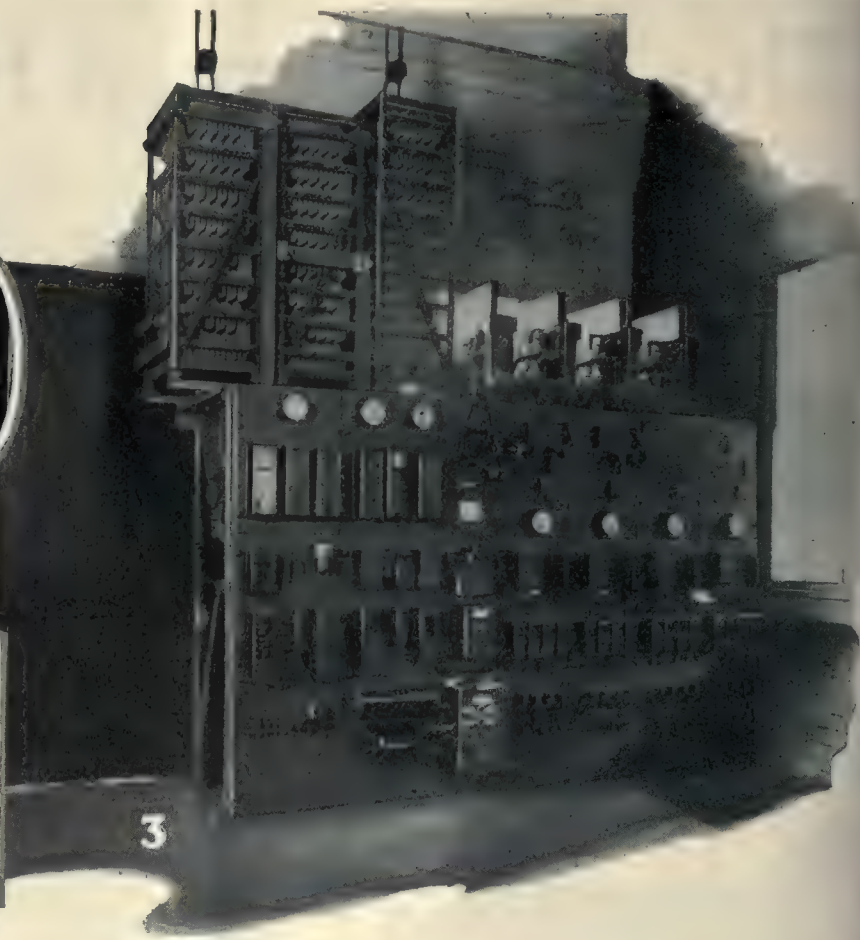
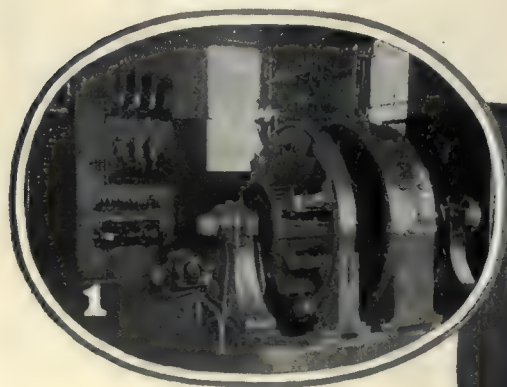
Nuttall Helical Gears with their smooth, quiet operation will eliminate this source of annoyance. Their meshing is like the turning of a screw, smooth, continuous and vibrationless. Because of the Nuttall BP Heat Treatment, they show a service life substantially so much longer that they are warranted on this score alone.

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

*All Westinghouse Elec. & Mfg. Co. District Offices are
Sales Representatives for Nuttall Railway Products
Canadian Agent: Lynian Tube & Supply Co., Montreal and Toronto

Nuttall

1. 1000-kw. synchronous converter with starting panel
2. The substation building
3. Automatic control and feeder panels



Only 2 Outages in 2 years— and both were brief

The Owenton Automatic Substation of the Birmingham (Ala.) Electric Company, in operation since February 1925, has had only two outages. Neither was caused by failure of equipment inside the station. In both cases repairs were quickly made and operation was promptly resumed.



The first automatic railway substation was placed in service by General Electric in 1914. The success of these early installations was so marked that the idea spread rapidly and there are now more than 325 G-E automatic switching equipments operating in railway service of all types.

Power is brought into this station at 13,200 volts, 3 phase, 60 cycles, through the transformers to the starting equipment and to the machine. The four outgoing 600-volt d-c. feeders are each protected by Type JR high-speed circuit breakers.

A time switch starts service at 4:45 A.M. and automatically shuts it down at 8:30 P.M. During the day the voltage on the trolley circuit controls the action. If the voltage is high, the converter automatically shuts down; when the voltage is low the station automatically starts up.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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CHARLES GORDON, Editor

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Number 13

Terminable Permits of Advantage Both to Investors and Consumers

MORE rapid adoption of the terminable permit, in place of the fixed term franchise has not come, according to Prof. E. R. Dillavou in this paper for March 24, because of two important things: First, the type of law to be enacted and, second, the kind of regulation best adapted to its use. When these two questions are settled he feels the way will be open for its more general adoption. Since the life of the utility becomes indefinite, the terms of the agreement become doubly important. But if it is now possible to draw up franchise laws that are satisfactory and will stand the test of the courts, there is no reason why they cannot be drawn for the terminable permit equally well.

As to the question of regulation, there is a great difference of opinion. Rates and service must be adjusted from time to time so that the utility can provide adequately for the community's wants, earn a fair return on the capital invested, and attract new capital as well as lay aside a sum sufficient to permit the utility to perpetuate itself.

Any fair-thinking body of men should be able to regulate in this manner. Naturally, local regulation is preferable, particularly with respect to service, since those intrusted with the duty are able to determine more closely the needs of the public. The ever-present difficulty, however, is that local politicians will not permit regulation to be so fair as when the supervisory power is removed outside their jurisdiction. Keep men of this type out of office and local regulation is easy.

The advantages of the terminable permit are so great that sight of them should not be lost for an instant. The plan has been adopted to a greater or lesser extent in nine states, and it can well be extended to all the states. As Professor Dillavou points out, the benefits are certain—neither the investors nor the consumers should be deprived of the advantages which are derived from the use of terminable permits.

From the City of the Unusual

STARTLING in what it may portend is another move, made by Mitten Management, Inc. It has to do with a working arrangement entered into by Mr. Mitten with the Amalgamated Association. In the quiet and calm of Atlantic City the Mittens and the Mahons, as the official statement puts it—meaning T. E. Mitten and A. A. Mitten and W. D. Mahon and O. L. Mahon, father and son respectively, through the good offices of W. Jett Lauck, former member of the War Labor Board, were brought to see the planet Mars in the same way through the same end of the telescope.

It is a significant move. Of that there is no doubt. On that account the official statement covering the agree-

ment is published in full elsewhere in this issue. Naturally, things immediate and things futuristic have been read into the document by the commentators. It was only to be expected that there should be some speculation. It may be that the real significance of the agreement now reached is contained between the lines rather than in them, but so far as Philadelphia and Buffalo are concerned, conditions there are to remain as at present, in order that the standard of economic excellence of these companies be the criterion by which union performance in co-operation with Mitten Management on other properties is to be measured.

As for the future, it is specifically stated in the memorandum that when co-operation between the Amalgamated and Mitten Management has developed to a point where the results are equal to those obtained on the Philadelphia and Buffalo properties, the matter of union-management agreements on these properties may be discussed and be made the basis of further agreement. The memorandum has been referred to as "one of the most extraordinary developments in the long history of the labor movement." That statement may, of course, turn out to be no exaggeration. In any event, the move just made is one that will again turn the attention of the industry to Philadelphia, the city of the unusual in railway operation and publicity.

Will the Trackless Trolley Regain Favor?

WHETHER or not there is an opportunity for the resurrection of the trackless trolley in this country, is a transportation question that justifies serious consideration. During the past several years this vehicle has not made much headway and after arousing some interest its popularity has actually waned. This in itself, however, is far from convincing evidence that the trolley-operated trackless vehicle does not have a place of considerable importance in the scheme of local transportation.

An analysis of the inherent characteristics of the trolley bus reveals no basic limitation. On the other hand there are indications which point strongly in the direction of a revived interest in its possibilities. Rapid strides have been made in the design of chassis for highway transportation vehicles since the early trackless trolleys were tried in this country. There has been likewise, rapid progress in the design of electric motors and control for highway vehicles. Although these latter developments have come about because of the attention given gas-electric drive for buses, they make available new equipment adaptable for the trackless trolley which opens up entirely new design possibilities for the latter vehicle in comparison with what was available at the time of early attempts.

There are two important factors, other than design, to be considered in determining the possibilities of the

Combination Switching Locomotive

Meets Unusual Requirements

Locomotive of New York Central uses either a battery charged by an oil engine-generator, or external power from overhead or third rail



Combination switching locomotive designed for different characters of service in New York City yards

TESTS were conducted recently by the New York Central Railroad of a new battery-oil-electric locomotive, designed for switching service in the New York City terminals and yards. It is primarily intended for use in the freight yards on the west side which are not electrified and where part of the time the locomotives are required to operate through city streets. Switching service requires that a locomotive respond quickly to applications of power, which in turn means that a relatively large amount of power must be available for short periods, even though the average energy requirement over an eight-hour shift is small. In order to secure this fast action from this locomotive it is equipped with a storage battery of relatively large capacity which can easily supply the high momentary currents required for switching service.

Since the locomotive will be used mainly in yards not electrified, the engine generator set, consisting of a 300-hp. oil engine connected direct to a 200-kw. generator is arranged for charging the battery. This engine is capable of supplying ample power to keep the battery fully charged for all switching service. The generator is so designed that if it is run at the same time power is being supplied to the traction motors it will divide the load with the storage battery under periods of heavy output without overloading the engine, and will return automatically to charging the battery as soon as the load has decreased. The voltage at light load is so proportioned that there is no danger of overcharging the battery.

As the generator capacity is more than enough to supply the average energy requirement of the locomotive over an eight-hour shift, it will not have to be run all

the time. This is especially advantageous in connection with work in the lower west side. At places where switching locomotives have to go inside of buildings the locomotive can be operated from the battery alone.

It should be noted that the engine is run at constant speed under the control of the governor, and this permits the maximum fuel economy to be obtained.

The storage battery consists of 218 cells, the maximum number so far used for locomotive service. This number is made possible by grounding the mid-point.

As the locomotive will be called on at times to operate over tracks which are electrified, third-rail shoes are provided and also an overhead collector. This permits the engine and battery to be disconnected from the traction motors when running in electrified districts. As the west side electrification is extended this feature will become more and more important. The third-rail shoes are of the folding type to permit operation in city streets.

The mechanical portion was built and the locomotive equipped by the American Locomotive Company at its Schenectady plant. The storage battery was supplied by the Electric Storage Battery Company and all other electrical equipment by the General Electric Company. The oil engine was furnished by the Ingersoll-Rand Company.

The locomotive was designed by the New York Central Railroad's electrical engineering department working with the General Electric Company, the Electric Storage Battery Company and the Ingersoll-Rand Company.

LOCOMOTIVE IS SWIVEL TRUCK TYPE

The locomotive is of the swivel truck type. The cab has three sections, the batteries being carried in the end sections and the oil engine in the central section.

The running gear consists of two four-wheel swivel equalized trucks. The truck frames are of the Commonwealth cast steel type with transoms and pedestals cast integral. These are carried on semi-elliptic springs to the equalizers which in turn are carried on the journal boxes through quiver springs. The transom is a hollow box casting which serves as a duct for the motor ventilation. Truck center plates are carried on the transom and the air for ventilation is conducted through the center of these plates into the transom and from there distributed to the two motors carried on the truck. Wheels are solid rolled steel with 44-in. diameter. The axle diameters are 8 in. at the motor bearings, and 9 in. at the gear fit, with 8x14-in. collarless journals.

The cab platform is a Commonwealth steel casting. The cab itself is of structural material riveted to the platform. The storage batteries are arranged in three tiers convenient of access from the outside. The central section of the cab has in addition to the power plant and the control apparatus, two small operating compartments for the enginemen. Good vision along the track is obtained from the engineer's seat as the battery section does not project sufficiently to interfere.

Doors give access to each operating compartment from the outside and to the power plant compartment from the operating compartments. There is a hatch in the roof of the central compartment directly above the oil engine to permit its removal.

ELECTRICAL EQUIPMENT DESIGNED FOR BOTH INTERNAL AND EXTERNAL POWER

The locomotive is equipped with four GE-286, 600-volt d.c. single-gear commutating pole traction motors. Each motor is geared to the driving axle through a 72-tooth gear and seventeen-tooth pinion. These motors and the gear ratio are the same as used on the New York Central Class Q electric switching locomotives. The continuous rating of the motor is 330 hp. at 600 volts and the one hour rating 415 hp. at 600 volts. At this rating of the motors the locomotive will develop a tractive effort of 34,000 lb. It will develop a tractive effort of 60,000 lb. with 900 amperes per motor. The operating characteristics of the locomotive and the tractive efforts available at various speed are shown in the accompanying group of curves.

WEIGHTS, DIMENSIONS AND BATTERY CHARACTERISTICS OF THE LOCOMOTIVE

Weights

Locomotive complete	257,000 lb.
Mechanical equipment	110,000 lb.
Battery	34,300 lb.
Motors	36,400 lb.
Engine and generator	28,800 lb.
Radiators and fans	2,700 lb.
Control	18,800 lb.
Air compressor and brakes	4,800 lb.
Miscellaneous	21,200 lb.

Dimensions

Length over coupler pulling faces.....	46 ft. 8 in.
Wheelbase	34 ft. 1 in.
Rigid wheelbase	8 ft. 3 in.
Height	14 ft. 8 in.
Width	10 ft. 2 in.

Tractive effort one-hour rating of motors.....	34,000 lb.
Speed at one-hour rating.....	18 m.p.h. on external power 8 m.p.h. on internal power
Maximum speed	40 m.p.h.

Battery Characteristics

Ampere-hour capacity at six-hour rate.....	680
Average volts at six-hour rate	432
Kilowatt-hour capacity at six-hour rate	294
Maximum discharge rate in amperes	3,000
Maximum kilowatt discharge rate	180
Approximate weight of battery, pounds	34,300



The battery sections are narrow enough to permit an unobstructed view by the engineer

Two motor blower sets furnish air for ventilation of the traction motors. Air for the air brakes is supplied by one CP-26-C4 compressor having a displacement of 120 cu.ft. of air per minute when running at 600 volts.

The control is type PCL, non-automatic with individual electro-pneumatic contactors. It is arranged for operation from either end of the locomotive. It is also arranged to permit the following methods of operation:

1. Internal power: (a) From storage battery alone. (b) from storage battery and engine-generator together.
2. External power: (a) From third rail. (b) From overhead.

The control is arranged to connect the traction motors automatically to internal power should the external power fail at any time (which may be due to running off the end of the third rail) and to restore the connection automatically to external power when the controller is shut off after external power is again available. Indicating lights show whether operation is from internal or external power.

Resistance steps are used for accelerating the locomotive both with internal and external power. The controller steps and motor groupings are as follows:

Ten resistance steps, motors connected four in series.
One running position, motors connected four in series.
Six resistance steps, motors connected two in parallel.
Two such groups in series.

One running position, motors connected two in parallel. Two such groups in series.

Seven resistance steps, motors connected four in parallel.

One running position, motors connected four in parallel.

The locomotive is protected against short circuits by a type JR high-speed circuit breaker. The individual mo-

tors are protected against overloads by overload relays which trip out the high-speed circuit breaker.

STORAGE BATTERY HAS 680 AMP.-HR. CAPACITY

The storage battery consists of 218 cells of MVA-41 Exide-ironclad battery. The ampere-hour capacity of the battery is 680 and the kilowatt-hour capacity 294 at the six-hour rate of discharge. All cells are connected in series for connection to the generator and traction motors but the mid-point is grounded to reduce the maximum potential to ground.

The control, lights, etc., are connected between each terminal of the battery and ground and arranged to equalize so far as possible any unbalanced loads on the two halves of the battery. The control is always connected to the battery even when running on third rail.

The locomotive has a complete metering equipment to assist in studying its utility for service and determining what, if any, modifications should be made in the equipment for future locomotives of this type. Ammeters and voltmeters at each operating position indicate the current of one traction motor and the voltage on the traction motor circuits. A speed recorder indicates and records the speed in miles per hour and registers the total miles traveled.

An ampere-hour meter indicates the state of charge of the battery. The zero point of the scale indicates full charge and the pointer moves forward or backward to indicate the ampere hours drawn from or supplied to the battery. An integrating ampere-hour meter connected in the battery circuit has two sets of dials, one of which indicates the total ampere-hours of discharge and the other the total ampere-hours of charge. One integrating watt-hour meter indicates the total energy passing through the traction motor circuits while another indicates the total energy delivered from the engine-generator set.

OIL ENGINE IS CONSTANT-SPEED TYPE; HAS DIRECT FUEL INJECTION

A 300-hp. oil engine direct connected to a generator is provided for charging the battery. The generator is built with a drooping characteristic to match the voltage characteristics of the battery and to furnish power to the traction motors in parallel with the battery under various conditions without overloading the engine, or overcharging the battery. The engine generator set is started by running the generator as a motor from the battery.

The engine is of the vertical, six-cylinder, four-cycle, single-acting, constant-speed type having direct fuel oil injection. The cylinders have 10 in. diameter and 12-in. stroke. Cylinders, cylinder heads, and combustion chambers are completely water jacketed.

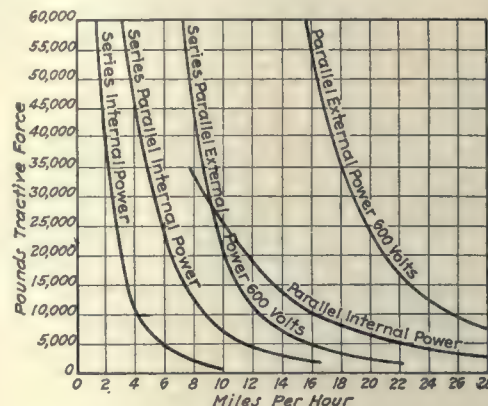
Fuel oil is injected by two opposed spray nozzles in each combustion chamber, to which oil is delivered under pressure by an injection pump driven from the main shaft. No compressed air is used for fuel injection. Ignition is produced by the heat of compression only. One fuel injection pump serves all cylinders. The fuel oil distribution is obtained by a distributor timed to admit oil to the spray nozzles of each cylinder in their proper firing order. The storage tanks have a capacity of 200 gal. of fuel oil and are sufficient to operate the engine at full load for about ten hours.

The lubricating system is entirely enclosed and of the forced feed type. Lubricating oil is pumped to the moving parts of the engine by a gear-driven pump in the crankcase. Oil in contact with the cylinder walls is

passed through a filter and returned to the crank case oil reservoir.

A closed cooling water system is used on the engine. The water is circulated by a centrifugal pump driven from the crankshaft. Radiators for cooling the engine circulating water are on the roof. These radiators are made in two sections, each ventilated by a motor-driven fan.

The engine is the same type as that used on a large



Tractive efforts at various speeds, operating from internal or external power.

number of oil-electric locomotives, with the exception that on this locomotive it is run at constant speed under the control of the governor.

The accompanying table gives the approximate weights and dimensions of the completed locomotive.

Combating the Would-Be Good Samaritan

NEARLY every electric railway company is losing considerable revenue because automobile owners insist on picking up not only their friends for short trips, but also total strangers who could just as well ride to their destinations on a near-by car line. The loss of this patronage, in the aggregate, is a considerable amount. One of the companies which has attempted to combat this evil is that at Little Rock, Ark., and the means followed by the Arkansas Power & Light Company have an interest for others who are trying to reduce losses of this character.

One method used is to carry occasionally in its advertising space in the daily papers accounts of injuries or losses suffered by automobile owners who followed this practice. Such an advertisement the early part of this year cited the case of a St. Louis professor who was attacked by two young men he had picked up and carried in his car, as well as of a suit brought in a local court against the automobile owner by such a free passenger for \$500 damages for an alleged sprained wrist he claimed to have sustained while riding in the Good Samaritan's automobile. Still another case was mentioned where a local man had to pay \$5,000 damages to an automobile guest who claimed to have been injured in an accident while taking a social ride in his host's car.

In the advertising which has been carried on this subject the company has made no definite appeal to the public to discontinue the practice on the ground that the street railway is being deprived of just revenue. It is the belief of the company that the public is not particularly interested in this phase of the problem.

Fast Schedules Bring Car Riders

By E. J. McIlraith

Staff Engineer Chicago Surface Lines,
Chicago, Ill.

The author, speaking before the meeting of the Illinois Electric Railway Association this month, showed clearly that fast schedules are within the ability of almost any electric railway, and without expenditures or complications

RARELY is attention paid to schedules and schedule-making. The title of this paper really calls for a discussion of fast schedules, or, in fact, consideration of speed, and not of the job of scheduling. We must assume in the beginning that schedules as written can be maintained on the street. A schedule that is not reasonably observed or that cannot be operated is, of course, undesirable. So we really are considering the advantages of fast operation or of quick transportation.

What is fast operation of street cars? Nearly all citizens today are automobile drivers. Those few who do not own automobiles or drive them, ride in them often enough so that practically everyone thinks in terms of automobile speeds, and it is speeds of the open road they remember. The word speed always seems to mean something over the legal speed limit. It is from 35 m.p.h. up, that represents the popular idea of speed today, and movement of less than 20 m.p.h. is a drag.

COMPARATIVE CAR AND AUTO SPEEDS

People are not accustomed to thinking of trips about town being made at an average speed of 15 m.p.h. from start to final stop, but if you ask a driver how fast he makes a given trip in town his likely answer would be "about 25 m.p.h." The average top speed while moving is what stands out in a driver's mind. So it sounds rather a contrast to mention average speed of a street car which in most systems would be an average of about 10 m.p.h. from terminal to terminal. The Chicago Surface Lines feels it has reason to be proud of its average speed between terminals, including time used at all intermediate stops, which is 11.2 m.p.h., and is higher than the speed of any other city system of which we know.

While such speeds sound low to the average citizen, who thinks in terms of his running speed not including slow-downs or stops, it is really unusual in driving in large cities for automobiles to average more than 15 m.p.h. between origin and destination. As congestion grows automobile speeds suffer seriously. Not much further increase for the street car can be expected. A vehicle making seven stops per mile, each of seven seconds' duration, cannot average as much as 15 m.p.h. even if on a private right-of-way. No matter how large

motors are used the limitations of starting and stopping keep the average speed below 15 m.p.h. Of course with smaller motors a lower speed results. Increasing the number of stops per mile has an enormous influence, and increasing the length of stop is also a serious source of delay. The sense of greater speed is given to the passengers because between stops the street car may run as fast as 30 or 35 m.p.h.

Operation as fast as possible is an absolute necessity to get business in these days of impatience and of speeding automobiles. Saving in time without recklessness is the thing we must drive at. The customers must be rushed through the trip without being made conscious of any danger, but rather with a feeling of comfort and

security. The street railway must establish in the minds of the people it wishes to serve the opinion that its service is regular and dependable and moves with the best possible speed and evident efficiency.

The train crew, whether one-man or two-man, must give the impression of prompt, efficient, alert attention to the job of moving the car safely and speedily over the street. This does not mean giving the passenger a sense of impatience and haste. The careful, efficient trainman who makes it most convenient for passengers to get on or off, who accelerates his car as rapidly as possible but smoothly, who brings the car to rest rapidly but skillfully, inspires confidence, and the passenger can be at the door ready to get off the moment the door opens instead of remaining clinging to something for safety.

It is not reckless haste that develops maximum speed, but competent, careful attention on the ways of eliminating waste of fractions of a second. Cars need not accelerate or brake at rates uncomfortable to passengers.

The big loss at present in braking efficiency is due to the slowness of getting braking under way. Many cars require two seconds for the braking pressure to build up in the cylinders and the brakes to get in contact with the wheels. In two seconds a car at 25 m.p.h. will move 75 feet.

Automobile brakes begin to function almost instantly, and no distance is lost between the time a man decides to brake and the time brakes are applied. Then, since automobile passengers are seated, the rate of braking can be more rapid than could be tolerated in a street car.

Further, the friction between rubber tires and pavement is better than the friction between the steel wheels and steel rails.

Improvement in braking will not come from increasing the rate of braking, but must come from reducing the wastage of time in getting the brakes applied. The present braking mechanism is not well suited to modern car operation.

The acceleration of cars can probably best be speeded up by automatic control. Of course, this is expensive, adds to maintenance costs and increases the chance of trouble. Thorough training of motormen will serve the same purpose. Motors of sufficient size are needed, but even with the best equipment the speed of a car will not be satisfactory unless the crew is alert, active and competent in saving moments of needless delay.

Few managements are today pressing the trainmen and the supervisory force to get this actual speed-up of the lines. The usual city crew gives the impression of leisure and indifference. There has been altogether too little attention paid to getting higher speed because most managements have accepted the idea that accident prevention demands slow speed and timidity. In many cities the motormen are actually afraid to move with certainty and as if they had a right to use the street. They are taught to hold back until all other traffic has gotten out of the way. Street cars need not apologize for being on the street, and operators should develop a recognition that each street car is as important as from 40 to 60 individual automobiles. Trainmen should be encouraged to operate safely at higher speeds. True accident prevention should build better operating principles into the minds of the trainmen, but not at the sacrifice of all their rights to move. Trainmen should be ready to avoid accidents, but should not let the automobiles assume superior rights. Analysis of accident causes does not show that fast operation properly handled creates accidents.

The training of the motorman and of the conductor, and the use of care to get them working in sympathy with a sound, well-planned viewpoint is a major portion of the problem of obtaining higher speed and lower accident costs.

If in the city that has the most intense use of streets, an average of 11.2 m.p.h. can be maintained for street cars, then in the smaller cities higher average speed should be possible because of relief from traffic interference and because of a smaller number of stops per mile. When speed is increased either the same number of cars will give a closer headway, or a smaller number of cars will maintain the same headway.

Increasing the speed by reducing wastes of time will certainly produce more business. It is the increased speed without the sacrifice of personal comfort for the passenger that is largely responsible for the growing business of the Chicago Surface Lines. In most large cities the street railway business is not growing. Perhaps a major part of the reason is because too little attention is given to increasing the rate of speed. Some cities are using more and more trains with longer headways. Perhaps the slower operation of trains and the longer headway has something to do with the decrease in the number of passengers obtained.

Many little things can become serious in producing low speed of operation. Here are a few that are within the control of the company without cost for changes in equipment:

Motorman accelerates slowly or brakes slowly.

Motorman stops car in the wrong place.

Doors opened slowly after the car has come to a complete rest.

Car equipped with interlocked door control.

Motorman coasts too much.

Brakes slack or braking equipment slow to operate.

Stops too close together.

Overhead wiring poorly set and requires slow speed to keep trolley wheel on the wire.

Car crew permitted to buy lunch, to stop for drink of water, to get transfers or change, or to visit carhouse at other points than terminals.

Track special work including curves in such condition as to require slow operation.

Switches operate hard.

Crew required to operate slowly over special work of all kinds when slow speed should only be necessary past facing switch points.

Low joints or broken rails.

Defective circuit breaker or circuit breaker set for too low current.

Improper setting of traffic lights or careless control by traffic officer.

Lack of safety zones at loading points.

Slow loading at heavy transfer points.

Of course many other small operating factors must be constantly watched, and should be continually improved upon.

A company need not wait to get new equipment, or to widen the doors, or to change the motors, or to make any other major and expensive change in order to improve its operating conditions. Usually remarkably good improvement in speed may be obtained with no other change than training and supervision of the operating force. This means training of the entire organization from the manager down so as to have each one working actively to discover ways and means of eliminating wastes of time and carelessness.

Most visitors to Chicago are looking for some big item that is responsible for the higher speed. They seem disappointed when informed that it is produced merely because of careful attention to the details. This attention to details is a measure of effectiveness of the management. If speed could be purchased by buying something which when installed would produce this speed all properties would probably have it.

All railways can be improved. We cannot ever expect to reach perfection; we can drive towards it, and should approach as nearly to it as can be accomplished with the resources under our control. Financial and political limitations are severe on all properties. Managements are not always able to accomplish what they most earnestly wish, but this does not justify failure to do the best possible with the given circumstances.

We should never be content that we have reached the ultimate limit of accomplishment, but we can often be content that we are making the most sincere effort towards that accomplishment.



The track yards at Paris are equipped with traveling cranes and other modern machinery

European Track Construction in Paved Streets

Points of resemblance and points of difference as compared with American construction are given. Extensive use is made of alloy steels in special track work. Paris methods are given in detail

By Henry W. Blake

Senior Editor *Electric Railway Journal*

IN MANY ways European electric railway track construction is similar to that in America. Some track in paved streets is laid on wooden ties, and some is laid on metal ties or chairs embedded in concrete. The single-web girder rail, in distinction to the duplex rail with two webs, is now standard in Europe as in America. In straight track the usual rail length is 18 m., practically the same length as our 60-ft. rail. Rails as long as 24 m. (79 ft.) have been laid, but their use has not been continued owing to the inconvenience of handling them on the streets.

The three standard rail heights recommended at the International Electric Railway Convention in Paris in 1924 were 7.1, 6.3, and 5.7 in. (180, 160 and 145 mm.). These rails are illustrated on page 536, but have not yet been formally adopted by the Association. As will be noted, the width of the base equals the height in each case.

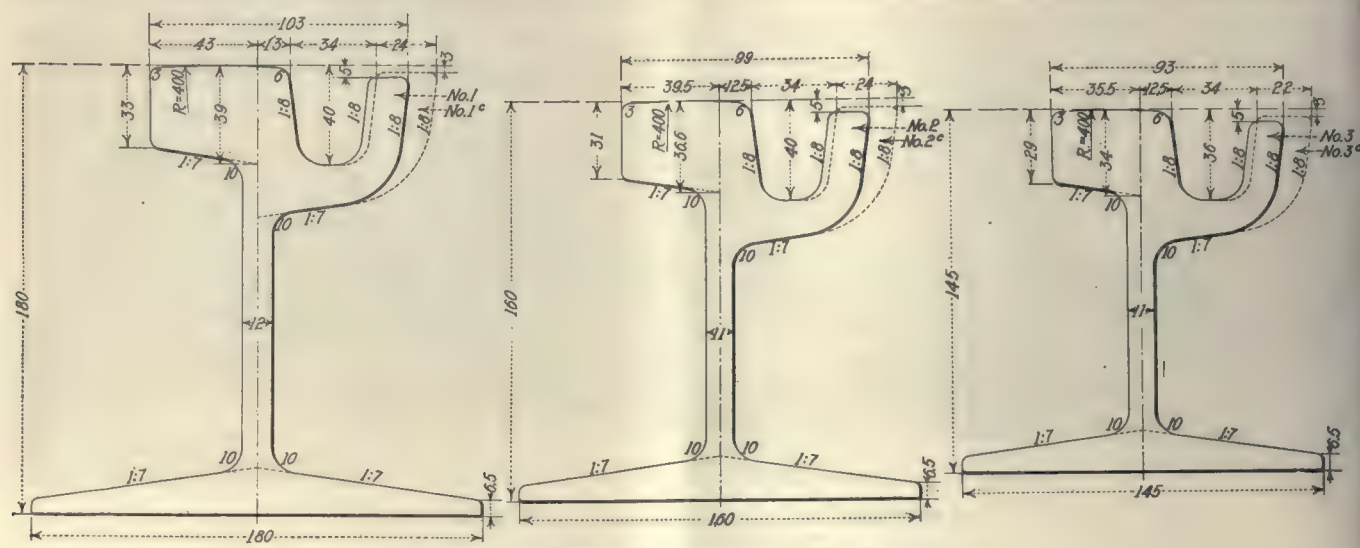
Manganese steel rail is generally used in special track work, although a number of the companies are experimenting with other alloy steels, such as chrome steel and nickel steel. Electrically operated track switches are used extensively.

The gage situation in Europe is practically the same as in the United States, though perhaps there is rather a larger proportion of narrow gage track. The two

gages most generally used are 1,435 to 1,445 mm., which are practically the same as our 4 ft. 8½ in. standard gage, or a 1 meter (39½ in.). The latest tabulation available on gage is a report presented at the 1926 convention of



Track construction in downtown Naples. The timbers shown are simply to protect the fresh concrete and will be taken away after that has set



Sections of standard rails recommended at Paris convention

the International Street Railway Association. It showed that of 31 companies, mostly city lines, replying to a questionnaire, sixteen had standard gage, twelve a meter gage and three odd gages. A more extensive statement was given in a report at the 1910 convention of the same association. Although this report is now some eighteen years old, gages naturally are not changed often, so that it may be assumed that practically the same condition prevails today. At that meeting, 105 railway companies, mostly street railways, reported on gage as follows:

TABLE I—TRACK GAGES USED BY 103 EUROPEAN STREET RAILWAYS					
Number of Roads	Gage of Track		Number of Roads	Gage of Track	
	MM.	In.		MM.	In.
1	891	35.0	31	1,435	56.5
1	915	36.0	7	1,440	56.7
48	1,000	39.4	4	1,445	56.9
1	1,050	41.3	1	1,450	57.1
3	1,100	43.3	1	1,453	57.2
1	1,345	53.0	2	1,458	57.4
1	1,416	55.7	2	1,524	60.0
1	1,430	56.3			

The two lines using the 1,524 mm. gage (5 ft.) were those in Moscow and St. Petersburg (now Leningrad).

POINTS OF DIFFERENCE ALMOST AS MANY

Having considered the points of resemblance between European and American electric railway track construc-

tion let us consider the points of difference. They are almost as many as the points of resemblance just referred to.

In the first place, the track construction in paved streets in the larger cities in Europe, at least in those visited by the writer during a recent trip, seemed on the whole to be more substantially built than that usual on similar properties in this country. This was especially noticeable in view of the much smaller and lighter cars operated.

Where wood ties are used, there is a tendency to employ the most durable kind. Oak is not uncommon, and wooden ties, when installed, are usually treated with a preservative. Some track is laid on steel ties and some on chairs embedded in concrete, with the rails kept to gage by tie rods. In the newer sections the installation of tracks on reservations in the center of the street is not uncommon. There is considerable construction of this kind in Berlin and Paris.

Thermit joints are used more extensively in straight track than is electric welding. Of the 36 companies that replied to a questionnaire on the subject of rail joints at the 1924 convention of the International Street Railway Association all but one were using thermit, although it was not standard on all of those so reporting. Bolted joints are also used quite extensively.



Rail-bending machines form part of the usual equipment of a track yard in Europe. The view at the left shows the rail bender at the Paris yards—The right-hand view shows the shelter housing the rail bender in the track yards of the Hamburg Street Railway. This shelter is directly in front of the company's large track storage house



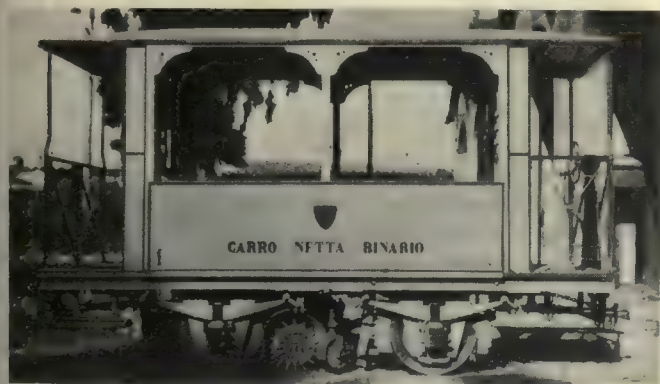
Track is often laid on reservations. The view at the left is from Berlin; that at the right from Dortmund

The groove in the rail is narrower than is customary in the United States, as will be seen from the sections reproduced. In fact, the groove in the rail is so narrow that it is not self-cleaning through the action of the car wheels, like most of the American grooved sections. Instead it has to be kept clean by track men who remove the dirt by an especially shaped shovel which they push before them, or by a digger which is carried on a car. Some companies have cars especially equipped for the purpose of keeping the head of the rail clean. Such a car, used on the Rome Municipal Tramways, is illustrated. It not only scrapes the dirt out of the groove in the rail and brushes it aside but it flushes the head of the rail with water from a reservoir carried on the car.

The continued use of a narrow groove on European tramways seems to be largely the fault of the city authori-



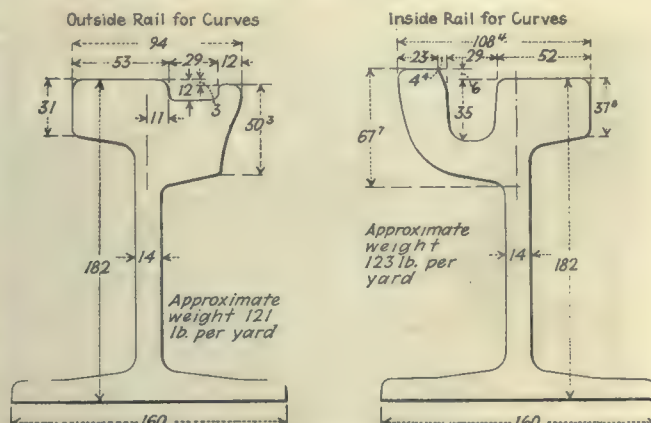
Paris is noted for its excellent special trackwork construction in paved streets



A work car cleans out the track groove and brushes the dirt away on the Rome Municipal Tramways. It also flushes the track. The upper view shows the complete car, the lower view shows the digging tool and rotary brush on a large scale

ties. When narrow-tired horse-drawn vehicles were used, such a narrow groove may have been necessary to some extent. With automobiles now so general, there seems to be no reason against the use of a flaring groove.

Alloy rail for places of great wear is used more generally than here, as on curves of short radius. More attention is given to the drainage of track, particularly of the track groove. It is almost universal to use groove



The outside rails on Paris curves up to 90 ft. radius use a shallow groove

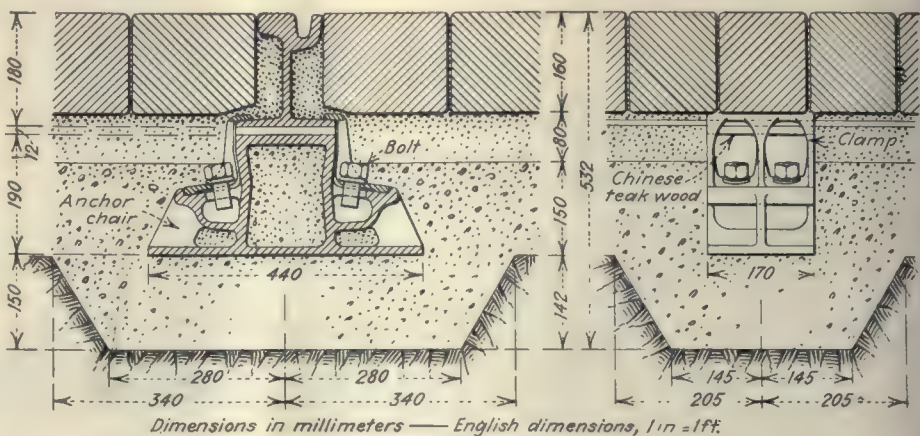
drainage. The maintenance of track as a whole is better in Europe than in America. This is a noticeable factor in reducing the noise of car operation.

At least as much attention is given in Europe to the use of track machinery in the construction and rehabilitation of track. Thus, a great many of the larger electric railway companies have power rail-bending machines, which are built in a variety of patterns in Germany and England. With the English bending machine used in Rome, two men can bend a rail in fifteen minutes. Rails can be bent on this machine to a radius of 40½ ft. The use of rail machinery is not always extended, however, to track grinding. Corrugation is often removed by the reciprocating action of a block operated by two men rather than by a rotary grinder.

An attempt to give details of the varieties of street railway track in Europe would require as much space as a similar article on track construction in this country. Instead an account will be given of the methods of track construction on the Paris overhead trolley lines. Within the center of the city these lines use the underground conduit system with the rails on yokes. The accompanying particulars relate to the construction on which the overhead trolley is employed.

TRACK CONSTRUCTION IN PARIS

The standard rail of the Paris surface lines is 7.1 in. (180 mm.) high, weighs 104 lb. to the yard (52 kg. to the meter) and rests on cast iron chairs embedded in concrete. These chairs weigh 54½ lb. (24.8 kg.) each and are spaced 51.2 in. (1.3 m.) apart except at the joints where they are closer together. Between the base of the rail and the top of the chair is a flat piece of Chinese teakwood ½ in. (12 mm.) thick, to give resiliency to the track. The chair has a base 17⅜ in. wide, or at right angles to the rail and 6⅞ in. in the direction of the rail. Its shape is such that it is held firmly into the concrete to which it transmits its load. It holds the rail by two clamps with lock nuts on each side. No ties are used, but tie rods are installed midway between the chairs, or every 51.2 in. (1.3 m.) apart. Special track-



Section of standard track construction in Paris. The rails are held in chairs embedded in concrete

work is supported on chairs like straight track. These chairs are of the same height and similar in design to those used elsewhere but of a special shape to fit the base of the switch, mate or other part supported.

Manganese rail is used for the inside rail of all curves of less than 93 ft. (30 m.) radius. It is purchased in

TABLE II—LIST OF MATERIAL FOR 100 M. (328 FT.) OF SINGLE TRACK ON CHAIRS IN PARIS

Number in	Wood Paving	Stone Block Paving	Designation	Material	Unit Weight	
					Kilograms	Pounds
200m.	200m.	200m.	Rail for straight track.	Rolled steel..	52.000*	104.0†
80	40		Tie rods.....	Rolled steel..	11.400	25.1
960	800		Bolt.....	Soft steel...	0.500	1.1
960	800		Lock nut.....	Spring steel..	0.070	0.15
160	160		Chair.....	Cast iron...	20.000	54.6
320	320		Clamp.....	Cast steel...	2.000	4.4
160	160		Wooden plate.....	Teak.....	0.270	0.59
1	1		Cross bond between rails.....	Copper.....	1.965	4.3
1	1		Cross bond between tracks.....	Copper.....	1.300	2.9
11	11		For bolted joints			
11	11		Outside plate.....	Rolled steel..	45	99
11	11		Inside plate.....	Rolled steel..	a pair	a pair
90	90		Bolt.....	Soft steel...	0.670	1.47
22	22		Rail bond.....	Copper.....	1.500	3.3
11	11		For welded joints			
11	11		Portion of thermit.....			

* Kilograms per meter. † Pounds per yard.



These two views show the method of laying track in Paris. It is first aligned, then mounted on wooden blocks, then the concrete is poured

tween the wheel flange and rail groove. Otherwise, the grinding would be considerable as most Paris cars are mounted on four 31½-in. wheels with a wheelbase of 11 ft. 10 in. This long wheelbase was adopted to reduce car nosing.

Besides its use of curves, manganese rail is standard for practically all crossings, switches and other special trackwork, and the throats of all such frogs are flange bearing. This practice undoubtedly has contributed greatly to noise reduction.

Other alloy steels, such as chrome steel and nickel steel, are also being tested for this purpose. The experience at the time of the visit of the writer to the property last summer was that manganese steel was more satisfactory, except that the other alloy rails had the advantage that thermit welds could be made to them more easily.

It will be noticed from all the Paris rail sections published that the head of the rail is absolutely flat. The treads of the wheels are also flat so that they have a bearing surface over the entire head of the rail. This design was adopted partly for the purpose of reducing rail corrugation and partly to reduce car nosing, which is thought to be greater where coned wheels are used.

Several photo engravings accompanying this article show the method of building track in Paris. It is not constructed from the bottom up but from the top down. After the trench has been dug, the track is laid in place with the chairs and tie rods attached. The track is then aligned and raised to position on wooden blocks. The final operation is to pour the concrete and then to lay the paving.

The cost of this construction without crossings or other special trackwork is approximately 300,000 fr. per kilometer (\$19,200 per mile) of single track.

Novel Color Advertising Featured

MUCH of the advertising literature of the Pittsburgh Railways, Pittsburgh, Pa., is unusual, particularly with respect to the use of color and also the advantages derived from seasonal subjects. The text matter of one campaign was confined mainly to accident prevention, the weekly pass sale and a series of sixteen traffic talks as issued by the Better Traffic Committee. The first talk, which was released coincident with the opening of the public schools, warned Pittsburgh citizens of the no-parking rules, at the same time reminding them of the city's narrow streets and that there are about 120,000 automobiles in the community, with parking space for only about 5,000 cars. This talk was followed by a humorously illustrated reminder of how business is retarded by too much parking. Some of the other talks, which were issued weekly, are reproduced on this page.

The colored autumn leaf poster used in previous years was also presented, with an element of timeliness by calling attention to an accident on Sept. 8 which resulted from the street and track having become dangerous due to their leafy coating. Another effective use of multi-

IT'S THE CAREFUL DRIVER WHO IS WRECK-LESS

What Do The Electric Traffic Signals Mean?

To Both Drivers
and Pedestrians:



The RED light means STOP. Drivers must obey the signals under penalty of street and fine of \$10.00 to \$50.00.

The AMBER or YELLOW light means "STOP AT THE NEAR CURB." It has one purpose only—to clear the intersection of both vehicles and IN IT. Pedestrians or motorists should NEVER START to cross the street when the AMBER or YELLOW light is shown.

MAY turn on green light to give pedestrians the right of way. Traffic signals are built—Each of the definite meaning and sure quick and also

No. 25

Why Should Pedestrians Obey Traffic Signals?



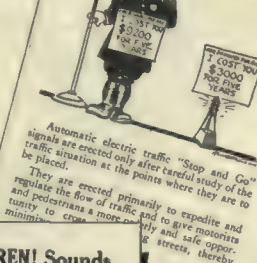
Traffic signals are for the protection and benefit of the pedestrian as well as the motorist. When the signal is against you, shows RED meaning "STOP," you should not cross the street. Start to cross the street only on the GREEN "GO" light. If you disobey the

You Should Always Give Warning Signal Before Pulling Out From Curb



The motorist who pulls out from the curb without extending his arm as a warning signal is running a serious risk of being struck by a

Where Should Electric "Stop & Go" Signals Be Erected?



Automatic electric traffic "Stop and Go" signals are erected only after careful study of the traffic situation at the points where they are to be placed.

They are erected primarily to expedite and regulate the flow of traffic and to give motorists and pedestrians a more orderly and safe opportunity to cross a more crowded street, thereby

"Cutting In" Is Extremely Dangerous!



Records show "Cutting In" to be one of the major causes of accidents.

How do you like it when another driver recklessly "cuts in" in front of you?

When you "cut in," you are taking a chance not only of wrecking your own automobile, but also involving other machines and unsuspecting pedestrians in an accident.

Play safe by keeping in line in your own lane of traffic.

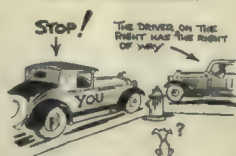
When passing another car, be sure there is room ahead and time enough. Sound warning signal, and pass always on the left.

Drive only on the right side of the road.

Extend to the other fellow the same consideration you expect him to show to you.

No. 29 of a series of "Talks" issued by the Better Traffic Committee, Pittsburgh, Pa.

Who Has The "Right-of-Way" At An Intersection?



Legally, the driver approaching on your right has the right-of-way. More accidents result from failure to observe this law than from any other one cause.

At corners, pedestrians always have the right-of-way over turning vehicles.

Although you may have the right-of-way, don't assert it too strongly. Remember the other fellow may not know the law.

Don't be like Sam Clay:

"Here lie the remains of old Sam Clay. He died maintaining his right of way. He was right all right as he looked along. But he's just as dead, as if he'd been wrong."

No. 30 of a series of "Talks" issued by the Better Traffic Committee, Pittsburgh, Pa.

When the SIREN! Sounds What Shall I Do?



The continuous blowing of a siren or clanging of bells (either on vehicles or on the corner) means the approach of fire apparatus or emergency vehicles to which the law gives the right-of-way. On hearing such a signal, all traffic should pull to the curb in the first available space and stop until all apparatus has passed.

Don't follow the fire apparatus! It is very dangerous and is very apt to interfere with the fire department.

No. 31 of a series of "Talks" issued by the Better Traffic Committee, Pittsburgh, Pa.

Some examples of publicity with which the Pittsburgh Railways is striving to put across the message of safety and service

color may be seen in the accompanying illustration where a comical bird is employed to put across the economy resulting from the use of the weekly pass. Perhaps the most interesting of the color ads is one which is a reproduction of the old-time school slate, which not only



Types of posters in color used by the Pittsburgh Railways

stresses the Sunday pass selling argument but maintains humor and brings back memories to the older residents of the city.

A very effective poster in black and white gives a list of the number of accidents per carhouse in terms of car-miles operated, settlement and verdict, cost per hundred car-miles and accidents per 10,000 miles operated. The

poster shows an auto caught by a street car and a telegraph pole on a dangerous curve. Referring again to the use of color, there was an interesting poster done in orange and red illustrated by a grotesque figure in black standing before a microphone. This was used to put over the radio show held at Duquesne Garden from Oct. 3 to 8. Another very effective poster showed a green cab and car drawn up side by side, the motorman and chauffeur grinning at each other. Underneath the text is as follows:

To Our Friends—the Motormen and Conductors: The traffic problem is our mutual one. The public safety on our streets and avenues is of constant and immediate concern to us all. By co-operation much can be done to solve this vital and important question. Green Cab is ready and willing to consider any way to help. We want to know how Green Cab men and the railway's men can work together for the public welfare. Suggestions from motormen and conductors on this matter will be welcomed by us.

This poster is signed, "Green Cab," below which is the slogan, "Let's all help the taxicab boys."

Although concerned with the distribution of larger posters, the Pittsburgh Railways has not neglected the little window pasters, some of which put over various problems in a few words; for instance:

Our present streets should be used for moving vehicles only. The parked car congests.

School opens this week. Please be careful of kiddies in the streets.

If every one would obey signals streets will be safer and all of us happier.

In addition to these forms of advertising the company still continues its policy of exhaustive publicity through the medium of the *Transit Guest*, the make-up of which is familiar to most of the readers of *ELECTRIC RAILWAY JOURNAL*.

Use of Maps Improves Service

STREET railway and interurban lines can add to their service to the public and increase the number of car riders, by a display of system maps in all cars and in terminals, according to an article in the *Public Utilities Advertising Association Bulletin* for February. Nearly all cities carry a transient population daily and house a portion of inhabitants who are familiar with not more than a fraction of the routes of their railway system. A better knowledge of the entire system, localities reached, points of general interest and educational institutions easy of access by trolley will increase car riders.

Wide adoption of one-man car operation has made it less convenient and desirable to interrupt the car operator. A complete map attached to the car window for ready reference will help patrons to answer many of their own questions by referring to the map. Such maps naturally should be designed to display street names clearly, designate car routes by number and bring out interesting points, of a nature to attract the public, in a graphic manner.

The use of car window maps is not altogether new. The Hudson Tunnel trains, joining New York City and New Jersey, carried maps for many years, attached to the center door of each car. Today each of the thousands of cars in the New York subways carries a map of the entire system. They have proved of widespread reference use.

In addition to car window maps, some companies distribute system maps in folded form and spread them widely in the thought that familiarity with the system is the first step in attracting traffic.

Manufacture Transportation That Will Sell

By E. G. Buckland

Vice-President and General Counsel
New York, New Haven & Hartford Railroad

Nations rise and fall as their transportation is good or bad. The only thing to do is to produce transportation of a kind that the people will buy at a price that will pay, said the author, speaking before the New England Street Railway Club at its Springfield meeting March 22

MANUFACTURING of transportation is no different than manufacturing of any other commodity necessary to the prosperity of a community. It may be that transportation is in a measure more essential to the prosperity of a community than any other one article which industry may make in that community. But the economics which govern it are identical. In the case of a street railway, it is the manufacture of passenger-miles that will sell. You cannot manufacture any commodity economically with obsolete, worn-out, extravagant machinery. Therefore, the only thing to do, where you find that more power is being used in moving a car than should be used, is to look to the bonding of your tracks, to look to the character of the construction of your tracks, to look to the weight of your cars, to see that your transmission lines are right, to see that your generating station is right. That is common sense, applied to any other industry, and it is common sense when applied to railroading.

Now, the New Haven Railroad happened to be very largely interested in street railways. And the job which was up to us to work out was to see if we could produce a kind of transportation that people would buy at a price at which we could sell it. There was nothing more complicated than that. There is, however, one thing which enters into that question of transportation which perhaps does not occur to the layman, but certainly is in the minds of most of you as representatives of street railways. And that is, the kind of transportation that people will buy.

FOUR PRINCIPAL MEANS OF TRANSPORTATION

I think we can say without fear of successful contradiction, that of the four principal kinds of transportation, that by water has its place as perhaps the cheapest kind of transportation to perform. The cheapest method of transporting masses of property overland is by the standard steam railroad. Now we have motor trucks and we have all sorts of other kinds of vehicles operating on the highways. All told they do not carry 5 per cent of the traffic. I wish sometimes that they would be required to carry the same degree of low-class traffic that we have to, but they apparently can pick and choose, and therefore take only the best. But in the matter of tonnage they do not carry more than 5 per cent of the traffic. I think, therefore, we can say safely that water

transportation between ports is the cheapest, but that overland transportation by rail is most economical and will prevail.

What is the place of the street railway? At the inception of our negotiations with the cities of Worcester and Springfield, Mayor O'Hara and Mayor Parker were good enough to appoint in each of their cities experts to study, along with our representatives, the characteristics of the street railway transportation carried on in these two communities. And it is curi-

ous how closely together those reports were in their recommendations. And it is also interesting that the reports were unanimous in both cities and in both places. They came to the conclusion that in cities of the character and size of Springfield and of Worcester, where large numbers of people had to be handled in peak hours in the densely traveled portions of the cities, there was no other means of transportation so economical of space and so satisfactory, as to speed and facility, as the street railway. When we come to operation between cities we get into a twilight zone. As the density of the traffic decreases the profitable or economic character of the street railway car likewise decreases. When, added to that, by reason of the magnificent highways which the state of Massachusetts has constructed, a means of speedy communication is afforded, we have found that we can do better by substituting passenger motor buses from the perimeter of the densely-settled portions of the community, operating express from the center of the city to that perimeter and locally beyond that.

Now, that is simply a common sense co-ordination of traffic, which we believe will work and which has the advantage, I believe, of giving to people the kind of transportation which they wish to use. And it is difficult to sell to a man a thing which he does not want.

While I am on that subject, the question has been frequently asked: If you agree that the street railway has its place, as you have stated, that the passenger motor bus has its place, that the railroad and the steamboat have their places as stated; why not the motor truck? Why should you stop arbitrarily and not carry property over the highway, just as you do carry passengers over the highway?

The answer is that we are stopped by artificial statutory enactment in the interstate commerce act. Sections 2 and 3 of this act forbid unjust or unreasonable discrimination between persons or places, and the Interstate

Commerce Commission has several times decided that a carrier subject to that act has no right to make a different rate in a locality, or to two persons in that locality engaged in the same kind of business. I am measuring my language here pretty carefully. The railroad has no right to make a different rate to one man than to another located in the same community, and doing the same kind of business.

If the railroad were to engage in the motor truck business, it would speedily find itself in this position, of continuing to give free delivery on a siding to an industry which had for a long time been established on that railroad siding, and charging an industry located a mile or so off the railroad for that transportation. And so long as it was engaged in motor trucking, there is nothing that the railroad could do to escape the imputation and the prohibition of unjust and unreasonable prejudice in charging the man located off its line for the motor truck haul.

Now, gentlemen, a few years ago we made an intensive study of the cost of trucking to and from our stations, and yards along our line, and we found that the amount which was paid was equal to the entire revenue which the company received for the carrying of the freight. If we were compelled to absorb motor truck charges we would probably go broke in 60 days. And that is the whole reason why you do not find the degree of willingness on the part of common carriers to engage in motor trucking that you find to engage in the carriage of passengers.

I am tempted at this point, because my subject is a pretty broad one—"The Co-ordination of Transportation in New England"—to say a few words to you who represent the producers of transportation, with respect to the character of the business in which you are engaged. I do not know whether you have ever really realized the importance of transportation in civilization. The great Francis Bacon once wrote this sentence: "There be but three things which make a country great and prosperous; a fertile soil, busy workshops, and easy conveyances for men and things from one place to another."

Whether he wrote Shakespeare or not, he uttered a great truth in that statement. There has never been a nation in the history of civilization that has risen to power that did not carry with it adequate means of transportation. I think we are entitled to accept the origin of transportation in Mesopotamia and in Egypt, which was the caravan route between the Red Sea, the Arabian Sea, and the Mediterranean. It is characteristic that this transportation followed the lines of transportation to Phoenicia, which controlled the Mediterranean. It was the envy of Israelites by reason of the magnificence of its commerce, that had spread to Carthage, which was a Phoenician outlying point, and remained in control of Carthage until Rome, in the three Punic Wars, wrested the control, and of the million population of Carthage only a few thousand were left. It was the outstanding characteristic of the Roman Empire, stretching from Jerusalem to the walls of Antioch, with a great stream of transportation which made it possible for the Roman

citizen to go the entire length of the Roman Empire with the products of the Roman territory. Later, Venice came to the fore, when she controlled the transportation of the seas, and traded with Constantinople, Greece, Syria and Egypt. Her prosperity increased and far surpassed that of the first Venice. Until she lost her transportation power the Roman Empire had prospered. Spain succeeded, and if she had been as willing to colonize as she was to conquer might have maintained her prestige today. But she ran against England, who was destined to colonize in conquering, and the Armada destroyed Spain's power because it took from her the means of transportation and gave it to the British Empire, which has maintained it ever since.

Here in the United States we have grown up with transportation. The thirteen original states, the real fringe along the Atlantic seaboard, measured the extent to which the sailing ship, and the row-boat, and the ox wagon went, and it so happened that almost at the beginning of these United States of ours occurred the beginning of new methods of transportation. We became a nation in

Are you interested in the solution of traffic problems?

Then read the

DETROIT TRAFFIC SURVEY

digest, the first section of which will appear in next week's issue.

1787. Within twenty years the steamboat was invented; within twenty more years the steam locomotive was invented; within 25 more years the telegraph was invented; in twenty more years the telephone was invented; all means of conveying persons and property in commerce, and the transmission of intelligence in commerce.

We, here in the United States, have grown hand in hand with the development in our transportation; in the intermingling of people, in the exchange of ideas, in the exchange of property, all of which are essentials to the progress of a nation. If you do not believe it in modern times, just compare two countries, the United States and Russia. They are not very different in area; Russia is somewhat larger. They are not very different in the breadth of latitude which they occupy. We have 262,000 miles of railroad; Russia has 25,000 miles of railroad. Can anyone doubt that if 100 years ago, when Peter the Great was teaching the greatness to which Russia was destined, he had educated his people and built 260,000 miles of railroads, ramifying through that great empire, that Russia today would have a great asset for national prosperity, instead of being a blot upon the nations of the world?

So you who are engaged in this great industry of transportation need never apologize for it. It is one on which I believe the prosperity of the world depends, and I am in good company when I predict that the peace of the world may depend on it; for it was only the day before yesterday when that splendid Lone Eagle, who winged his way alone from New York to Paris, and afterward as the Ambassador of Good Will to the countries about the Caribbean, said that the differences which existed between those countries existed because it took days and weeks to go through the jungles and over the mountains, but that by air that distance could be traversed in two or three or four hours, and these people be brought into contact, each with the other, so that these

jungles of doubt and mountains of ignorance might be levelled, and be brought to a common understanding.

It is that which gives us as transportation men the vision which Tennyson gave us so many years ago in Locksley Hall, when he spoke of the time when "the war drum throb'd no longer, and the battle flags were furl'd in the Parliament of Man, and the Federation of the World."

Winnipeg Company Uses Gas-Electric Car



The interior of the gas-electric car is roomy and comfortable

RAPIDLY increasing traffic on the Winnipeg River Railway due to pulp, wood and mining activity in central Manitoba made necessary recently the installation of a Mack model AS gas-electric car by the Winnipeg Electric Company.

The car is 52 ft. long, 10 ft. wide and over 12 ft. high. It weighs 30 tons and carries 59 passengers. The car is of aluminum construction throughout, contains a parlor car section, smoking compartment, express room and the usual conveniences found on standard main-line trains. It has a rating of 120 hp. From the viewpoints of comfort and utility, the car has proved highly satisfactory. Well-cushioned spring seats absorb all road shocks.

Witness Blank Tells of Bonus

ACCIDENT PREVENTION BONUS

The conductor and motorman of this car are paid a bonus for safe operation, which they lose if involved in a preventable accident.

The management and employees take pride in an exceptional record for safe operation—and solicit your co-operation.

Your name and address on this card will assist the company in giving fair treatment to all concerned.

Name

Residence

Telephone Number

City

Business Address

Telephone Number

City

DATE THANK YOU

Brooklyn witness card tells of bonus plan

SINCE the introduction of the bonus system for excellence of accident records, conductors and motormen of the Brooklyn City Railroad, Brooklyn, N. Y., have been turning in the names of more witnesses than they did previously. In order to assist them still more, a new form of witness card has been made out which tells the witness of the participation of motormen and conductors in the bonus for safe operation. It is believed that with the use of this card, the accident records will continue to improve.

More Light for Chicago Readers

ELECTRIC lamps with clear glass which have been standard in the cars of the Chicago Surface Lines, Chicago, Ill., rated at 23 watts, are being replaced by 36-watt lamps, with inside frosting. This change was determined upon after an extensive investigation. These new lights will provide 40 per cent more illumination, making it much easier for passengers to read newspapers. Additional energy required for these lights will amount to about \$25,000 a year.



This gas-electric car is handling passenger traffic on an outlying line of the Winnipeg Electric Company's system

Maintenance Methods *and* Devices

Emergency Trolley Tension Rod



This trolley base tension rod is a time saver when the regular rod breaks

PROPER trolley pole pressure is easily obtained in the event of a broken rod with the trolley base tension rod shown in the illustration. It was developed by one of the trouble men of the Cincinnati Street Railway, Cincinnati, Ohio. This rod may be attached to the trolley base without driving out the pin that holds the end of the broken rod in place. As a result this tension rod has been found a very effective time saver for emergency jobs of the nature described.

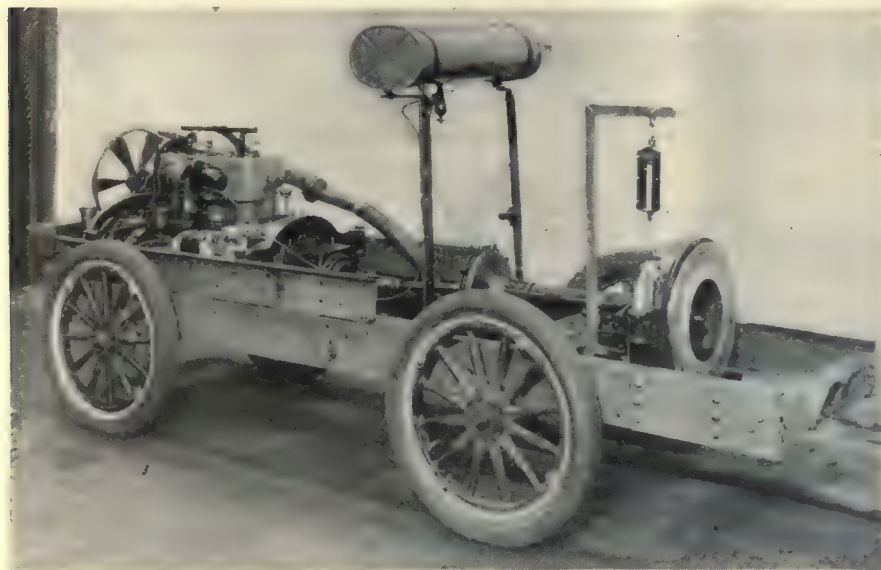
Portable Dynamometer Set for "Running-In" Motors

IT IS BELIEVED by the bus maintenance department of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., that the bearings of automotive engines which

have had their periodic or emergency overhauling completed, are best run in with a portable prony brake dynamometer.

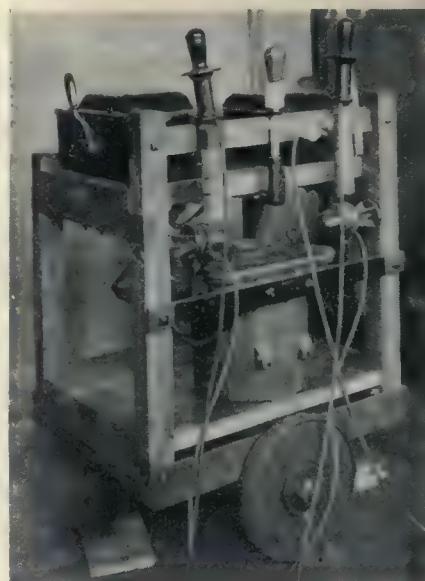
The truck assembly of dynamometer equipment shown in the accompanying illustration was made in the company's shop to answer this purpose. It consists essentially of a deep channel side frame bolted together with end pieces of almost equal depth to form a rigid chassis. This is mounted on ordinary light-weight automotive type axles, with wheels proportionately of light construction and taking 30x3½-in. tires. An additional steel frame is mounted at one end of the chassis with cross members so spaced as to permit the mounting of either four or six-cylinder motors as used with the bus equipment.

It has been found that proper "running-in" of motor bearings is not insured simply by operating such a motor at an idling speed over a period of twelve to eighteen hours. The prony brake is used, therefore, to load the engine progressively over a period of twelve hours until during the last one to one and one-half hours or so, it is carrying as nearly normal full load as can be approximated. The first two hours of the "running-in" process is at no load, the next eight hours a load of about 33 per cent of normal full load is held, and the finish is with the engine operating at its rated horsepower.



This portable prony brake dynamometer was made in the Milwaukee Electric Railway & Light Company's own shops to solve the problem of properly "running-in" bus motors

High Tension Test Outfit



SINCE publication of the article by R. S. Beers on a simple high-potential testing outfit in the JOURNAL for March 24, page 505, a photograph of the actual device has been received. This is reproduced herewith. The basis of the outfit is a standard 110/2,200-volt lighting transformer. The auxiliary equipment and the testing leads are also shown.

Wood Commutator Cover with Added Features

FAILURE to latch properly often caused the malleable iron commutator covers furnished originally with the GE-80 motors to be lost in service. This necessitated a continual replacement with a resultant high maintenance expense. The New York & Harlem Railroad, New York City, has developed a wood cover with a locking screw to prevent this. It is made of oak, oval in shape and is 19½ in. long, 9 in. wide and 1 in. thick. One-half of the thickness of the wood is cut away for a distance of 1⅝ in. from the edge. This leaves an oval boss 16⅞ in. long by 6⅜ in. wide. The boss fits into the commutator hole of the motor frame and prevents shifting of the cover. A ½x4-in. steel plate installed across the entire width of the cover at the middle acts as a reinforcement as well as a footing for the holding screw. The holding



Wooden commutator cover takes place of lost ones

screw support is a malleable casting and is bolted to the top half of the motor shell. This casting projects over the plate for about 3 in., and the end is drilled and tapped with $\frac{1}{2}$ -in. machine threads.

The holding screw is made from $\frac{1}{2}$ -in. round bar. It is bent at a right angle with a short end of $2\frac{1}{2}$ in. and a long side of $4\frac{1}{2}$ in. The short end is threaded for installation in the support and the long side is used as the handle. This cover is light, and since the locking handle is within easy reach of the workman no difficulty has been experienced in keeping it on at all times.

Portable Vacuum Cleaner for Car Seats

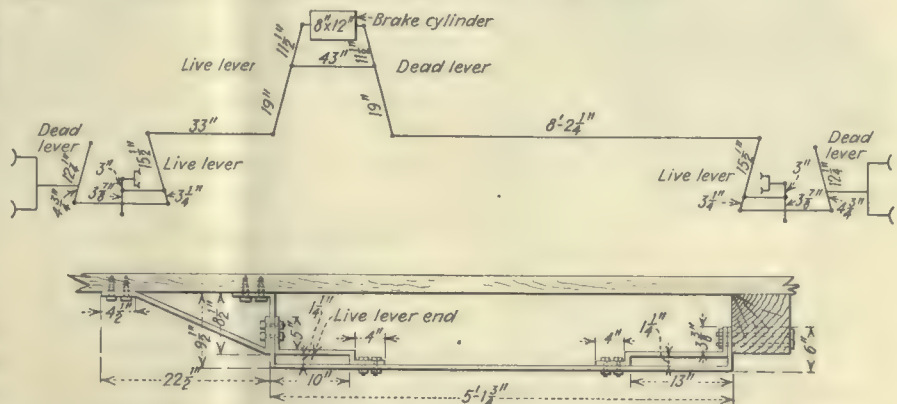
PLUSH and cane seats in the cars of the Atlantic City & Shore Railroad, Atlantic City, N. J., are cleaned at regular intervals by means of an Electro-Lux vacuum cleaner. This is

a small portable equipment operating on 110 volts alternating current. Convenient outlets at this voltage are located at intervals through the car shops. The process takes about $4\frac{1}{2}$ hours per car, including removal of dust and dirt from the floor around the seat supports, and from the arm rests and window sills, as well as from the seats themselves. A thorough cleaning is given to each car once every two weeks.

Safety Stop for Brake Cylinder Levers

SAFETY and continuity of service being considered of importance on the New York & Queens County Railway, Woodside, N. Y., nothing is overlooked that will tend to improve these factors. To guard against a total loss of the braking

power if one of the pull rods breaks led to the design of a stop which would assure one-half of the braking effort. This was accomplished in the following manner: A flat bar $\frac{1}{2}$ in. x 3 in. x $66\frac{3}{4}$ in. is installed in such a position that it supports the ends of the brake cylinder live and dead lever in a horizontal position. One end of this carrier is fastened to a cross sill by $\frac{1}{2}$ -in. through bolts and the other end is secured to the center sill by $\frac{1}{2}$ -in. lagscrews. A piece of $\frac{1}{2}$ -in. x 3-in. iron is bolted to the carrier over each lever so that it forms a slot 10 in. long for the live lever and 13 in. long for the dead lever. These slots allow free movement of the levers under normal operating conditions, and with a broken pull rod act as a stop for the loose lever. This permits the proper functioning of the complete braking equipment fastened to the other lever.



Arrangement of safety stops for brake levers

Twenty Things to Avoid in Maintaining Cable Leads

1. Cutting of wire strands when removing cable insulation.
2. Making a terminal connection with ends of strands twisted.
3. Removal of too little insulation so that only one setscrew takes hold of the cable.
4. Terminal and connector setscrews not locked with jam nuts and lock washers.
5. Soldering of cable ends by inexperienced men.
6. Poor cleaning of conductors preparatory to soldering.
7. Solder that is too cold.
8. Soldering acid that is too weak.
9. Rough soldered joints with poor insulation.
10. Solder spattered over face of commutator and necks at armature connections.
11. Acid flux spilled on armature windings.
12. Poor insulation of field coil terminals after making cable connections.
13. Iron setscrews dropped in motor frame and left there.
14. Poorly supported leads anchored inside motor frame.
15. Cable for motor leads and wiring around frame that is too stiff.
16. Reversed field coils from wrong cable connections.
17. Motor leads brought out of frame by non-uniform methods.
18. Insecure cleating to hold leads to motor frame and car body.
19. Leads arranged so they will rub on motor or car parts.
20. Knuckle joint connectors placed in the swinging loop.

New Equipment Available

Light-Weight Calculator

LESS than 7 lb. is the weight of a calculating machine announced by the Burroughs Adding Machine Company, Detroit, Mich. While small and compact it is equipped with full-size keys, a standard keyboard, visible adding dials and operates the same as the larger models. The machine is but $6\frac{1}{2}$ in. wide and $11\frac{1}{4}$ in. long. It has an accumulating capacity



Small compact computing machine

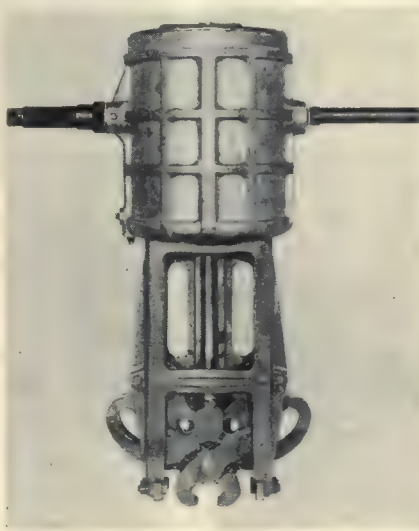
of 9,999.99 for addition and multiplication. Subtraction and division are facilitated by the proper complementary figures on all keytops.

The mechanism of the new calculator is adjusted to high-speed work. It was brought out primarily to meet the requirements of railways and public utilities for a low-priced machine for revenue accounting work, and for checking invoices and computing payrolls.

Air-Operated Spike Puller

SPIKE pulling is facilitated by a tool developed for the purpose by Ingersoll-Rand, New York, N. Y. It is claimed that with it one man can pull eight to ten spikes per minute. The machine is light, so that it can be moved quickly by hand from tie to tie. It is said to consume on the average only 3 cu.ft. of air per spike.

To pull a spike the throttle is turned to admit air on top of the plunger. As the plunger moves down a link arrangement opens the jaws on the lower end. The machine is then set with the jaws around the spike and the foot-rest on the lower flange of the rail. Air is admitted by rotating the throttle and the plunger rises. The pull from the



Air-operated spike puller

plunger moves the links to close the jaws under the head of the spike and clamp it firmly. As soon as the jaws clamp a strong upward pull draws out the spike.

Hydraulic Jack Used for Pressing In Bushings

HEREWITH is shown a Blackhawk hydraulic jack of 7-ton capacity installed so as to act as a horizontal press. All hydraulic jacks of the Blackhawk Manufacturing Company, Milwaukee, Wis., operate horizontally providing the pump side is down. To help speed up production a spring is fastened to the base of the jack and to the side of the ram. When the release valve is



Method of using hydraulic jack as a horizontal press

opened this spring pulls the head of the jack off the finished job, and allows removal of the piece and the placing of a new shaft and collar.

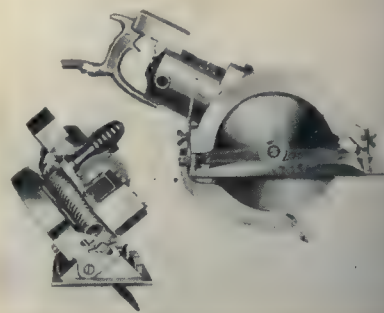
Manganese Steel Drilled Successfully

IT HAS always been considered impracticable to drill or machine high manganese steel. With the advent of a new cobalt steel, however, the Morse Twist Drill & Machine Company, New Bedford, Mass., announces that it has been able successfully to drill railroad frogs with a chemical content of 1.08 carbon, 10.04 manganese, and with a Brinell hardness of 207-217, using a drill of special structure to withstand extreme torque and point pressure.

On one grind nine holes each $1\frac{1}{2}$ in. deep were drilled through the railroad frog. The company announces that it is now prepared to make drills for this work upon specification.

Portable Electric Hand Saw

BEVEL sawing, at any angle up to 60 deg., in addition to vertical sawing is announced as a feature of a new hand saw produced by the Wodack Electric Tool Corporation, Chicago, Ill. The new type B portable electric hand saw has a tilting



New type portable electric hand saw

base which can be set and locked at any angle within the 60 deg. range, by means of a slide and locknut.

Another new feature is that of the width gage for vertical sawing, which can be set for any dimension up to 6 in. With it various widths of strips can be sawed without the necessity of marking.

Like other Wodack saws the type B has a built-in General Electric universal motor which operates on both alternating and direct current. Each saw is furnished complete with a one 11 in. and one 9 in. blade.

Association Activities

Utilities Problems Discussed at Baltimore Meeting

Beneficial results to be accomplished formed the theme of the principal speakers at the sixth annual convention of the Maryland Utilities Association held in Baltimore, Md., last week

WITH ADDRESSES by nationally known experts in their particular fields, the Maryland Utilities Association held its sixth annual convention at the Emerson Hotel, Baltimore, Md., Friday, March 23, 1928. In order to promote liberal discussion of the various problems, the morning session was divided into four groups, electric, transportation, gas and water. In the transportation group Dean J. Locke, staff engineer United Railways & Electric Company of Baltimore, told of traffic conditions and various schemes of traffic control used in Chicago, Cleveland, Detroit, Pittsburgh and Baltimore. An abstract of his paper is published elsewhere in this issue.

In the discussion following Mr. Locke's paper, C. D. Gaither, police commissioner of Baltimore, told of some of the problems that were confronting the police department and of various remedies that were being tried to solve them. Carl W. Stocks, editor *Bus Transportation*, spoke briefly of the desirability for uniformity in traffic regulation, and Clarence W. Squier, associate editor *ELECTRIC RAILWAY JOURNAL*, spoke of the reduction in accidents that could be expected from improved traffic control and the advantages of safety zones and wide left turns in speeding up the movement of traffic in city streets.

The electric group discussed various committee reports and listened to a paper by Earl Whitehorne, commercial editor of *Electrical World*, on developing domestic loads. The gas group heard about care and maintenance of the gas meter by A. M. Wolfe, assistant manager Maryland Meter Works, and the water group had a general discussion on their problems.

The afternoon joint session was taken up largely by three addresses by prominent officials of the American Electric Railway Association, the American Gas Association and the National Electric Light Association. In comparing electric railways with other public utilities, L. S. Storrs, managing director American Electric Railway Association, commented on the size of the electric railway industry and by various comparisons showed its real importance and that, in fact, it must be considered as one of the greatest factors affecting the growth

and prosperity of any community. Without transportation, he said, development would lag badly. An abstract of Mr. Storrs' address is given below.

Major Alexander Forward, managing director American Gas Association, prophesied the ultimate elimination of smoke and spoke of some of the things that he believes could be expected in the future for gas producers. He gave some statistics to show the trend toward con-

solidation of industry. Interstate power was discussed by Major H. S. Bennion, director of engineering National Electric Light Association.

In the business session of the association, the following officers were elected: President, H. T. Connolly, general manager Washington, Baltimore & Annapolis Railroad, Baltimore, Md.; vice-president, H. A. Brooks, Potomac Electric Power Company, Washington, D. C.; treasurer, R. E. Town, Potomac Edison Company, Hagerstown, Md.; secretary, David Kinnear, United Railways & Electric Company of Baltimore. The directors chosen were Adrian Hughes, Jr., L. G. Smith, C. H. Leatham, Frank Meyers, Frank Mitchell, and G. W. Woolford.

The evening session included a banquet and addresses by Albert C. Ritchie, Governor of Maryland, and William F. Broening, Mayor of Baltimore.

Electric Railways Are Not Looking for Charity*

BY LUCIUS S. STORRS

Managing Director American Electric Railway Association

IN RECENT years the electric railway branch of the public utility business has been regarded almost as a "poor relation." With \$5,500,000,000 invested in it, with 300,000 men on its payrolls, and with its service to nearly 16,000,000,000 of passengers per annum, it still is a great enterprise. But lately the growth of the power and light business has been so spectacular, and the troubles of the electric railways due to the competition of the private automobile and the unregulated bus have been so prominently before the public, that the vitally necessary service which the electric railways are rendering to the public, and which they will continue to render, has been somewhat obscured.

But the electric railways are not "poor relations." They are by no means clamoring for charity. They are asking for better understanding, for better appreciation of the fact that they are rendering a service that cannot, by any stretch of imagination, be dispensed with; they are seeking the full co-operation of the public in the rendering of that service.

Electric railways do render an essential, absolutely necessary service. The reason why electric railway service is irreplaceable is that it is the most economical means of transporting the masses of the people. Nothing yet has been devised that is so efficient and inexpensive in carrying large numbers of people from their homes to the factories,

to the shopping centers, to the theaters and other places where people must gather in large bodies.

The principal field for the electric railway is in the medium and large-size cities. It is inconceivable that a city like Baltimore could continue to be an attractive, prosperous metropolitan city without such excellent service as the local street railway gives the public.

Too often the question of rate of fare occupies the public mind, when the real problem is quality of service. Where can you buy for 5 cents anything that you could have bought for that sum ten or fifteen years ago, except possibly a postage stamp? Yet the 5-cent fare has been a political fetish in some of our large cities, notably in New York, where the inadequate revenues of the electric railways have prevented the development of the kind of service which the people really want, but which their political overseers have prevented them from getting.

It is gradually sinking into the public mind that something cannot be gotten from a street railway company for nothing any more than something can be taken from a grocery store without payment. You may force your public utility to continue to give you service at less than a fair rate of return, but

*Abstract of an address delivered before the Maryland Utilities Association, Baltimore, Md., March 23, 1928.

rest assured that that company cannot continue forever to give service under such a handicap and remain a sound business organization. Sooner or later the day of reckoning comes, and then you have receiverships, with the lopping off of non-paying lines, destruction of values, disruption of the business of the community and greater expense and inconvenience to the public.

FARES SHOULD GIVE A REASONABLE RATE OF RETURN

If I had any plea to make, more than another, it would be for recognition of the right of the electric railways to earn a rate of return that would permit them to render the public the high quality of service which the public wants. The granting of that plea would insure the continuance of this necessary service with ever-increasing improvement. It would insure as ready a flow of capital into the electric railway industry—publicly regulated and controlled—as flows into private business enterprises, many of them by no means essential and all of them free from public regulation.

Granting of that plea would put quality and adequacy of service over everything else. It would make the rate of fare a matter of secondary importance, which it rightfully should be.

The first essential of any public service is *adequacy*, and as the service is publicly controlled it is within the power of the regulatory authorities to insist that it shall be adequate. But a company not earning its operating expenses, or at best a mere pittance above them, is in no position to give the public the kind of service it most earnestly wants to give and which the public desires and ought to have.

In some parts of the country, notably in Ohio, the service-at-cost franchise has solved the problem of adequacy of service and reasonable rate of return. This kind of franchise provides that a specified rate of return on the value of the property shall be counted as part of the cost of providing the service. The rate of fare fluctuates according to the condition of the operating surplus of the company. You probably are familiar with the franchises in Cincinnati and Cleveland, in which those large cities recognize a fair return on the value of the properties as a proper element of the cost of service.

I am not here advocating any particular kind of franchise, I cite these instances merely in support of my statement that the public is coming to recognize more fully the importance of permitting its street railway companies to charge rates of fare that will assure the investors a reasonable return on their money invested in the public service. The same result may be obtained under any franchise, provided the regulatory bodies, the public and the companies have mutual understanding of their obligations to each other, mutual confidence and respect and a common ideal—the provision and support of a truly adequate public transportation service.

Traffic and Traffic Control in Various Large Cities*

By DEAN J. LOCKE,

Staff Engineer United Railways & Electric Company of Baltimore

OUR highway systems, designed for the most part many years ago to meet the then existing traffic conditions, are inadequate today. It is the purpose of this paper to describe briefly the traffic in a number of cities visited and make a comparison with Baltimore.

The visitor to Chicago is quickly impressed with the absence of congestion in street and pedestrian traffic within the downtown Loop district. Most of the streets are either 38 or 48 ft. between the curbs. Blocks are laid out in a rectangular pattern, and average 400 ft. north and south, and 320 ft. east and west.

The co-ordinated traffic light system now in use in the Loop district of Chicago has three objects in view: (1) to release traffic officers for better use in the promotion of safety and reduction of ordinance violations; (2) to speed up traffic, and (3) to increase the capacity of the streets. The system was a success from the start. It nearly doubled the speed of street cars and motor vehicles through the controlled district and increased the street capacity by from 25 to 50 per cent. Regulations on parking that became effective two years later, further materially increased street capacities. Records of the Police Department indicate a reduction of 23 per cent in the number of personal injuries from automobile accidents as a result of the signal control.

At the entrance of the controlled area the signals are set to admit traffic part of the time, and part of the time to permit traffic on the cross streets. This breaks the lines of vehicles into groups or platoons separated by an interval of time. As each group moves along the street toward the succeeding street intersection, the signals at that intersection are made to give an indication in their favor just as they arrive. The interval between the changes in lights at successive intersections is timed to permit steady movement under average conditions. The travel on cross streets flows in the interval between these groups and in a similar manner.

When the system was planned the data indicated that a 90-second cycle would be necessary. In practice traffic movements have been so facilitated that for normal weekdays six different lengths of cycle are now employed during the different periods of the day, ranging between 50 and 70 seconds. On Saturdays seven different cycle lengths are employed, as the traffic at times is materially different from that on other weekdays.

Shortly after the signals were placed in operation, parking within 50 ft. of the downtown signal lights was prohibited to promote better vision at the street intersection, to facilitate the load-

ing of street cars and to minimize delays at congested street corners. At each stopping place at the near side of each intersection a car safety zone has been established. Free wheel vehicles are required to use the lane between the curb and the loading zone.

All left turns are prohibited at all intersections within the Loop except at the boundaries of the section.

On Jan. 10, 1928, parking in the Chicago Loop section was prohibited by ordinance during business hours. This "No Parking" ordinance affects an area of approximately 1 mile square. Within the past few days opponents of the plan have succeeded in securing an amendment to the ordinance permitting ten-minute parking of passenger automobiles within the Loop district.

With the parking ban as first instituted vehicles move with a saving in time of more than 20 per cent during the evening rush hours and of more than 30 per cent during the middle of the day. Pedestrians move more freely with a greater sense of security. Street car schedules are much more regular and save 15 per cent of passenger time. Cabs, buses, private and commercial cars operate as before, and passenger vehicles can stop to receive and discharge passengers as they always have done. All of these benefits have been obtained without limiting the use of the street to traffic in any way. It simply means that vehicles cannot block the streets by using them for storage.

CLEVELAND'S NATURAL ADVANTAGES

Cleveland has about 225 traffic lights installed at the present time. The great majority of these are at isolated corners in outlying sections and work independently although controlled by the master timers of the groups to be described. There are, however, three groups of signals, working on the co-ordinated control plan, which handle traffic on heavy arteries in a most efficient manner.

The first group is that on Euclid Avenue between Public Square and Eighteenth Street, where, in the shopping district for a distance of about 4,000 ft. nine signals have been installed with control centered in a tower at Ninth Street, the busiest intersection.

The second group is that on Carnegie Avenue between 30th Street and Sterns Road, where 21 signals provide co-ordinated control of free-wheel vehicles for a distance of more than 3 miles. Carnegie Avenue is a main artery of travel. Traffic consists almost entirely of passenger cars and buses; slow-moving trucks are diverted to parallel streets. Cross traffic at the different in-

*Abstract of a paper presented before the Maryland Utilities Association, Baltimore, Md., March 23, 1928.

Essential Features to Successful Solution of Traffic Problems

1. Without genuine co-operation and unselfish contributions by the various interests involved, including the city administrators, the police, business organizations, transportation companies and the general public, the present-day traffic problems cannot be solved as they should be.

2. The immediate problem, apart from that of city planning, is concerned with means of securing the maximum efficiency in the use of existing streets and other traffic facilities.

3. Traffic control devices have passed the experimental stage, but they should be installed only after very careful engineering investigation and study into all the facts and conditions surrounding their use and when a definite need for them has been established. There is real danger that the widespread installation of signals at isolated intersections will result in great delay to traffic which will not be compensated for by added safety.

4. Automatic traffic control devices, when installed under proper conditions and operated properly, increase materially the capacity of streets, the speeds of vehicle operation and the safety of individuals using the streets.

5. Parking is the principal and least justifiable cause of street congestion. It is the crux of the traffic problem in most cities, including Baltimore. Parked cars cut our street widths in two, strangle business and delay all who use the streets, while only a few car owners are benefited.

6. Materially greater provision should be made for off-street storage of motor cars in the business district.

7. Where free wheel vehicles and street cars are in conflict, separate lanes of travel should be provided to permit the fluid movement of traffic. To this end, car stops generally throughout the business district should be provided with clearly defined safety or loading zones. Where street widths are too narrow to permit of clear free-wheel vehicle lanes opposite such zones, curbs should be recessed, where physically possible.

8. Boulevard stops, when carefully located, are a material aid to the relief of traffic congestion and to the promotion of safety.

tersections varies from a volume approximately equal to that on Carnegie Avenue, to a very small amount. The width of Carnegie Avenue permits four lanes of traffic. In the morning rush hour three lanes are occupied by inbound traffic and one by outbound, while in the evening rush hour three lanes are occupied by outbound traffic and one by inbound. The system is so adjusted with a cycle of 84 seconds that traffic at a speed of 25 m.p.h. can move in both directions without interruption. Motorists may now cover the controlled section in an average time of ten minutes, where formerly with manually operated semaphore control, 21 minutes were required.

The third installation is on Euclid Avenue in East Cleveland, where for a distance of more than 3 miles, sixteen intersections are co-ordinate-controlled from City Hall. There the roadway is 68 ft. in width. The 61-second cycle permits of an average vehicle speed through the section of about 24 m.p.h. and an average car speed of about 12 m.p.h., including stops. Elevated car loading platforms are used at each car stop.

The streets adjacent to the boundaries of the Loop district in Detroit are rectangular in pattern with widths of about 60 ft. between building lines. In the center, however, streets are in radial and circular pattern, with Grand Circus Park as a center. Some of the radial streets, including Woodward Avenue, are as much as 120 ft. wide. The street plan makes the control of traffic difficult.

Traffic on the principal streets is controlled by some 125 automatic signals, mounted in a variety of ways, hence somewhat confusing to users of the streets.

PRACTICAL BENEFITS IN DOUBT

The signals operate on a fixed 56-second cycle split equally between green and red. They are controlled from one timing mechanism. The light aspects are staggered to provide progressive movement of vehicles at about 20 m.p.h. With this arrangement the aspects down any one street at any given time are individually or in groups alternately green and red. While this plan when installed penalized traffic on the main thoroughfares while giving an unduly

long interval to minor cross streets, it was supposed to speed up both motor and street car traffic some 60 per cent and to reduce the accidents very materially. There has, however, been some controversy as to its practical benefits and I understand that it is proposed to rearrange the signal timing mechanism to provide for co-ordinated control, as in Chicago and Cleveland. A trial installation of this type has been in successful operation for some time on Cass Avenue between Temple and Antoinette Streets.

PITTSBURGH'S TOUGH PROBLEM

Undoubtedly Pittsburgh has one of the toughest traffic problems to solve of any large city in the United States. The business center, termed "the Triangle," lies in the fork of two rivers, and is surrounded by hills and precipices. The blocks are irregular and narrow. Practically two-thirds of the blocks are under 300 ft. in length. About half of them accommodate but two lanes of traffic. Most of the three-lane streets, comprising 40 per cent of the blocks, are one-way streets and have been such for a number of years.

At the present time traffic control in the Triangle is by officers using semaphore signals. Congestion is so great that vehicular speeds are very low and street capacities are decidedly limited. That these conditions are not worse is due in considerable measure to a no-parking ordinance which prohibits parking on a vast majority of the downtown streets either for 24 hours a day or between 8 a.m. and 6 p.m.

A solution of Pittsburgh's traffic problem is in sight, however, as the result of the untiring efforts of the Mayor's better traffic committee, which, appointed early in 1925, has made a comprehensive study of the problem and recently has submitted a report recommending: (1) The immediate installation of a "flexible co-ordinated" electric traffic control system in the central business district; (2) that steps be taken to bring about obedience to signals by pedestrian traffic as well as by the vehicular traffic; (3) that immediate consideration be given to the elimination of many of the left-hand turns; (4) that immediate consideration be given to the prohibition of horse-drawn traffic from certain major streets during the peak hours, with the setting up of certain suitable by-pass streets for this type of traffic.

It is proposed to install electric signals at some 100 downtown intersections at a cost of several hundred thousand dollars. These signals would be master-controlled at some convenient centralized point and would provide a means of increasing street capacities and the safety of movement. The studies made indicate a possible time saving for both motor vehicles and street cars in traversing the proposed signalized area of from 30 to 40 per cent.

Here in Baltimore we have a serious traffic problem. Within the central business district 66 per cent of the roadways are less than 40 ft. in width and 50 per cent of the blocks are less than 300 ft. long.

At all but a few intersections downtown traffic control is by officers using semaphores or lights. No parking is permitted between 7:30 and 9:30 a.m. and between 4:30 and 6 p.m. on a limited number of streets, while two-hour parking is permitted generally between 9:30 a.m. and 4:30 p.m.

Outside the business district traffic is controlled at some 135 intersections by automatic lights, most of which are controlled individually. The exceptions are small groups on North Avenue, Mount Royal Avenue, the Fallsway and St. Paul Street, which are synchronously operated, and a group of twelve lights on Cathedral Street, which recently have been connected with a more modern co-ordinated type of control. The Cathedral Street group permits continu-

ous flow of automobile traffic for a distance of 4,200 ft. at 22 m.p.h. The length of cycle is 63 seconds. Plans have been made for the use of co-ordinated control on North Avenue, a heavy crosstown street on Lincoln Highway, and on St. Paul Street, a heavy radial artery. Co-ordinated electric signal traffic control is also planned for some sixteen intersections on Baltimore and Howard Streets in the central business district. Boulevard stops are little used. Street car stopping places on the railway system as a whole average ten per mile during rush hours with the rush-hour stop plan, and twelve per mile during non-rush hours.

The features most essential to the successful solution of our traffic problems are given on page 549.

cester railways, and the man in charge of arrangements for the record-breaking meeting. Mr. Wood welcomed the huge crowd and thanked everyone, from the officials to the track repair crews, for their presence and their interest.

Mayor Fordis C. Parker, of Springfield, welcomed the members of the club to the city. He spoke with gratitude of the efforts of the Springfield Street Railway to maintain the highest grade of service. He said that the expenditure of more than \$800,000 by the company last year was evidence of the attempts being made to render the best possible service. He thanked Mr. Wood for his endeavors and experiments that had given the city a type of street car that is being copied in other communities.

The city of Worcester was represented by Mayor M. S. O'Hara, who congratulated the officials of the New York, New Haven & Hartford Railroad for their courage in buying a railway that was on its "last legs" and putting it on a sound basis again. He told how the old cars had been painted and repaired, and the service improved more than 100 per cent. He said that it was a satisfaction to have responsible persons running the buses in the city. He was proud of the fact, he said, that powerful interests would spend money on the railway property to provide better service for the residents.

Capt. Ralph Earle, president Worcester Polytechnic Institute, gave an interesting talk on the duties and accomplishments of the United States navy during peace times. Robert Burlen, of Boston, concluded with what he termed "A Message" to the effect that humor is necessary to play the game of life.

Modern Equipment Interests New Englanders

IMPROVING electric railway service through the use of up-to-date equipment was the principal subject of discussion at a meeting of the New England Street Railway Club held at Springfield, Mass., March 12. At the afternoon session W. L. Harwood, engineer of power and equipment of the Springfield Street Railway and the Worcester Consolidated Street Railway, told about the results achieved with the Springfield experimental car. An abstract of Mr. Harwood's paper appears elsewhere in this issue. He illustrated his talk with lantern slides showing details of the equipment. The advantages of the treadle door over the older type of door operating mechanism were outlined by J. H. Vander Veer, sales engineer National Pneumatic Company. His talk was accompanied by motion pictures showing operations of treadle doors on electric railway cars in many cities.

Commenting on the necessity for giving up-to-date service, Lucius S. Storrs, managing director, American Electric Railway Association, pointed out that the number of people who ride on the electric railways during the course of a year is greater than the number of postage stamps sold in the United States. Improvements being made to the local transportation systems in many cities, he said, are indisputable evidence that the public transportation industry is on the road to recovery. Charles Gordon, editor of *ELECTRIC RAILWAY JOURNAL*, mentioned the recent developments in car design as one of the most significant things in the field of local transportation today. W. C. Slade, vice-president, United Electric Railways of Providence, said that electric railways have been marking time during recent years because they have been undecided whether to buy more cars or to buy buses. Developments in car design fostered by the Springfield and Worcester companies will mean much, he said, to the future of the industry.

Improvements to the Springfield and

Worcester Street Railway system were not made for idealist reasons, according to E. G. Buckland, vice-president New York, New Haven & Hartford Railroad. Mr. Buckland's remarks are given elsewhere in this issue.

More than 500 men, a record-breaking number for the New England Street Railway Club, attended the banquet in the evening. Howard F. Fitch, vice-president of the club, presided at the banquet and made brief remarks welcoming the men to the dinner and convention. He deviated from the regular program to introduce Clark V. Wood, president of the Springfield and Wor-

Energy Consumption Low on Springfield Experimental Car*

BY W. L. HARWOOD

Engineer of Power and Equipment Springfield Street Railway, Springfield, Mass.

SEVERAL years of thought and experimenting by the Springfield Street Railway have resulted in the Springfield experimental car.

It would be too long a story to tell of the development of the various pieces of equipment which finally went into the completed car, but after some delays and some interesting experiences, the car was finally completed shortly before midnight, April 13, 1927, and on Thursday, April 14, at 10:30 a.m., made a scheduled exhibition run with some 40 prominent persons. The run was successful beyond expectations. Between that time and May 13 this car made many demonstration runs for the benefit of men connected with the industry from many parts of the country. On May 13, 1927, it was put into regular service on

one of the heaviest city lines and has to date made some 12,000 miles.

We have been operating the experimental car on one of our heaviest city lines, the State Street Line. This line operates on State Street with a maximum grade of 6.5 per cent, with some 1,300 ft. averaging over 5 per cent. The line loops through Dwight Street and returns via Main Street. The round trip is 7.1 miles and the actual running time varies from 48 minutes during the lighter periods of the day to 58 minutes during the rush hours, making the schedule speed from 7.3 m.p.h. to 8.9 m.p.h. Some tests taken last May showed 5.8 equivalent stops per mile at times of non-congestion and 13.5 stops per mile during congested periods. The car has made some 12,000 miles in this service, having been out of service for about a month, in order to go to Cleveland, and has carried some 75,000 revenue passengers (transfer passengers

*Abstract of a paper read at a meeting of the New England Street Railway Club, held at Springfield, Mass., March 22.

not included). During this service, the car has performed very satisfactorily and has developed no major defects. When first put into service, the press named it "The Noiseless Car," due to its quiet operation. There are no gear or brake noises, the only noise being the trolley wheel on the wire and flange noise of the wheels on the rail. The low unsprung weight, combined with the long springs and rubber shock-insulators, allows the car to pass over special work with a rather pleasant click, quite different from the noise made by the conventional car. Tests made by the A.E.R.A. committee on noise reduction also show it to be more quiet in operation than our other cars.

The light weight and roller bearings allow the car to accelerate very smoothly and rapidly. Under test, rates as high as 2.2 m.p.h.p.s. have been noted, and in actual service rates average around 1.5 m.p.h.p.s.

Braking rates as high as 4.35 m.p.h.p.s. have been noted, and in revenue service the braking rates run around 2 m.p.h.p.s. While these are high braking rates, the effect on the passengers is not uncomfortable, as the rate is uniform without objectionable changing or jerky operation. This is partly due to the special material of which the brakeshoe is made, having a fairly constant coefficient of friction with varying loads, and there is no seizing action as the car comes to rest. In emergency, full brake chamber pressure can be obtained in less than $\frac{3}{4}$ second, and in service, in something less than $1\frac{1}{2}$ second which, combined with the rapid rate of retardation, makes possible stops in the shortest distance.

To get an accurate comparison of the power required by the experimental car as compared with a modern light-weight car, we equipped both the experimental car (No. 554) and one of our 50 new light-weight double-truck safety cars (No. 565), with watt-hour meters. Both cars are operated regularly on the State Street line. The results are as follows:

	Kilowatt-Hours per Car-Mile
For the month of December, 1927, the total amount of energy required, including heat, lights, air compressor, etc., for No. 554 was.....	3.19
And for No. 565 was.....	3.65
For the month of January, 1928, the energy used by No. 554 was.....	3.27
And by No. 565 was.....	3.88

That is, in December, 1927, the light-weight double-truck safety car No. 565 used 14.4 per cent more energy than the experimental car, and in January, 1928, 18.7 per cent more energy.

A special energy test of 8.7 miles, with one car following the other, making the same stops as traffic required, and measuring energy for motors only, showed an energy consumption as follows:

Car No. 554, kilowatt-hours per car-mile...	1.61
Car No. 565, kilowatt-hours per car-mile...	2.18
Car No. 554, kilowatt-hours per ton-mile...	0.127
Car No. 565, kilowatt-hours per ton-mile...	0.119

In this test the light-weight double-truck safety car No. 565 took 35.4 per cent more energy than the experimental car.

Another test of 9.5 miles over another route at rather higher speed, with fewer stops, showed the following:

Car No. 554, kilowatt-hours per car-mile...	1.58
Car No. 565, kilowatt-hours per car-mile....	2.11
Car No. 554, kilowatt-hours per ton-mile....	0.125
Car No. 565, kilowatt-hours per ton-mile....	0.116

In this case the light-weight double-truck safety car used 33.5 per cent more energy than the experimental car.

The weight of car No. 565 is 36,500 lb. against 25,300 lb. for experimental car No. 554—car No. 565 is 44 per cent heavier.

There have been no worn-out parts or replacements in the 12,000 miles of

service. A thorough inspection made recently showed no wear in the bearings and the worm gear and work shaft were in perfect condition. It is too early to predict what the life of bearings and drive will be, but there is every indication of long life. Brakelinings show wear of only $\frac{1}{8}$ in. for 10,000 miles of service, which would indicate that we will obtain about 20,000 miles per set in our heavy city service. Based on 12,000 miles of operation, there is every indication of low maintenance.

New Business Can Be Developed With Advertising and Publicity*

By E. E. SOULES

Manager Department of Publicity Illinois Traction System, Peoria, Ill.

FROM an industry that was largely non-advertising ten years ago there is today being spent better than \$6,000,000 each year for city and interurban transportation advertising. How and why the industry has brought advertising into its operating program is of interest; what have been the results and what results may be expected is the present-day concern.

The modern railway manager uses advertising continually to keep his public informed about the affairs of his company. He has learned that it does not pay to wait until there is trouble and then rush into print and expect the public to join in the mourning. He knows that the public is not interested in the troubles of the advertiser, and that they would rather hear of success than failure; but he also believes that the public is notably fair, and that if it can be made to see that the community is directly affected by the failure or success of the transportation system it may be depended upon for support.

Ask a progressive city railway operator for concrete figures on the result of his advertising. If reports for comparative periods show increased riding he will state that in his judgment advertising, plus good service, and perhaps plus changed conditions, have all had a part in the improved reports. If reports do not show increased riding or earnings he will tell you that without advertising the story would have been worse.

Recent years have produced but few examples of increased riding on city properties. An outstanding exception with which we are all more or less familiar is the city of Chicago, where the surface and elevated lines have shown consistent increases. It is significant that both of the operating companies in Chicago have within recent years established advertising departments that have effectively used the display columns of the newspapers. It is not contended, even by the advertising man, that advertising alone has been responsible for the upward turn in Chi-

cago. Increasing difficulties for the motorist who now finds street congestion almost unsolvable has also tended to put passengers back on the rail cars; while speeding up of schedules and re-routing of basic lines is keeping passengers on the cars. But advertising and publicity have played an important part by first telling the story of things to be done and things accomplished, then selling the public on the advisability of doing the things planned, and finally selling them again on the use of new and improved services.

NEWSPAPER THE BASIC MEDIUM

There is such a variety of operating conditions that no standardization of advertising methods has been developed by city railways. Following well-proved advertising practises the newspaper is the basic advertising medium. On the average about 65 per cent of transportation advertising appropriations is expended in the columns of the daily and weekly newspaper. The street railway and bus operator has a decided advantage in having a medium of advertising without cost in the car card space in his own cars and buses, and dashboard space on the outside of his cars, but its real value is not appreciated by many operators. In recent years city transportation advertisers have come to more generous use of outdoor advertising, principally in the form of painted bulletins. The radio, the motion picture and other novelty forms of advertising are included in the plans of a few companies.

High-pressure sales methods are not entirely lacking in city transportation advertising. In recent months we find a representative company in the mid-west city offering reduced bus fares on certain "express" lines during off-peak hours of the day. In another instance we find free rides advertised for the day on which a new bus route is opened. We find other companies co-operating with retail stores on special shopping days by offering free rides during certain hours.

The advertising activities of electric interurban railways, which at first were secondary to the publicity work, have

*Abstract of a paper presented before the Illinois Electric Railways Association, Springfield, Ill., March 14-15, 1928.

steadily grown. Companies were to a great extent impelled to adopt active selling and advertising policies by the keen competition offered in the transportation field, by the growth in popularity of the private automobile, the interurban type of motor bus and the increased hard road mileage. Because the interurban railways have been employing strenuous merchandise and advertising tactics over a longer period of time, there are available more examples of developing new business in this field than in that of the city operating company.

There are sufficient examples of developing new business with advertising in the interurban field to convince the doubtful operator that advertising, when coupled with sound merchandising principles and a saleable service, does produce results. Here again the first attribute to success in terms of increased business is a service that permits the electric carrier to compete on a service basis with other carriers. In every instance where the company has been able to secure and hold new customers it will be found that the quality of the service has warranted the merchandising and advertising that is used to sell it.

SELLING IMPROVED SERVICE

In the passenger field many improvements designed for the special comfort of passengers, such as standard parlor, sleeping and dining cars, luxurious modernized coaches, faster schedules and smoother roadway, have been made by the electric railways. In the freight field there has been intensive solicitation for local freight and express, and many of the larger companies have redesigned and rebuilt motive power and equipment to place them in position to handle through freight in car lots with interchange of equipment and rates with other carriers. Advertising and publicity has had much to do with acquainting the traveling and shipping public with these developments.

Today we find electric railways not only using the pages of local publications for their freight traffic advertising story, but also the columns of traffic magazines with national circulation. In these pages the shipper of freight in San Francisco, in New York, in New Orleans is told that certain electric railways solicit freight shipments in carload lots to and from any point in the United States. The Illinois Traction System was the first electric railway to place its advertising regularly in a traffic magazine of national circulation. It began to tell this story only after it was capable of giving a valuable freight service to the national shipper, and now finds it profitable to maintain representatives in most of the larger cities for the solicitation of through freight business.

Taking an illustration from the remarkable story of the Chicago, South Shore & South Bend Railroad, we find an electric railway which through rehabilitation of its physical properties and reorganization and modernizing of its traffic and sales policies, almost

doubled its gross revenues in less than two years. Advertising played an important part in this noteworthy transportation achievement, as it has also done in the rejuvenation of the Chicago, Aurora & Elgin Railroad.

There was a time when "doorbell ringing" was considered an undignified type of solicitation, but the advertiser of today appreciates the value of personal solicitation and the modern electric railway is making good use of this form of approach. The employee sales campaigns of some of the most progressive railway organizations have proved their worth as business producers for both the passenger and freight depart-

ments. The Chicago, North Shore & Milwaukee Railroad was a pioneer in this method, and it has also been used to good advantage by the East St. Louis & Suburban Railway in introducing new motor bus routes.

Many electric railways are acting as ticket agents for athletic events and theatrical attractions, reserving seats and selling combination tickets that include transportation and seat accommodations.

The direct mail medium of advertising is given an important place in the advertising plan of the modern electric railway. Lists of memberships of lodges, civic clubs, social organizations, school classes and various kinds of societies are usually available and the personalized letter announcing a special service or innovation is an effective and dignified method of approach, providing it is not repeated too frequently.

Outdoor advertising is a valuable medium in territories where population is dense and circulation is heavy. This has been demonstrated to the satisfaction of companies like the Chicago, North Shore & Milwaukee Railroad, the Chicago Rapid Transit Company, the Chicago, South Shore and South Bend Railroad and the Chicago, Aurora & Elgin, which have the advantage of telling their story to a tremendous outdoor circulation through the use of painted bulletins and lithographed posters.

Exhibits at expositions, public speaking activities, use of the radio, motion picture and other novelty advertising will be found in the advertising plans of many companies and are used with various degrees of success. Results from this form of media, however, are not easily checked and they are of value principally for general publicity purposes.

COMING MEETINGS

OF

Electric Railway and Allied Associations

April 6—Metropolitan Section, A.E.R.A., 33 W. 39th Street, New York, N. Y.

April 25-27—American Welding Society, annual meeting, 33 West 39th Street, New York, N. Y.

April 26-28—Missouri Association of Public Utilities, Jefferson City, Mo.

May 2-5—Southwestern Public Service Association, Dallas, Texas.

May 6-12—Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, biennial meeting, Rome, Italy.

May 9-10—Central Electric Railway Master Mechanics' Association, Erie, Pa.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 20-27—American Railway Association, Div. 5—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association), annual convention and exhibit, Atlantic City, N. J.

June 21-22—American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

July 27-28—Central Electric Railway Accountants' Association, Detroit, Mich.

Aug. 16-17—Wisconsin Utilities Ass'n, Transportation Section, Sheboygan, Wis.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

American Association News

Entertainment

PLAN early and well, was the motive of C. S. MacCalla, chairman of the entertainment committee, in calling the meeting held on March 26 at association headquarters in New York. Last year's results were discussed and plans were developed for the coming convention to be held during September in Cleveland.

With the addition of a theater seating 5,000 and a smaller ballroom now being completed on the auditorium property it was planned to have all social events on the "pier," as the verbiage goes after so many years at Atlantic City.

The meeting was headed by C. S. MacCalla, chairman, and attended by J. C. McQuiston of East Pittsburgh, vice-chairman; Ralph Emerson, Cleveland; Joe Stewart, Jr., Cincinnati; S. J. Cotsworth, Philadelphia, and John A. Dewhurst, L. S. Storrs, J. W. Welsh and A. A. Hale, all of New York.

News of the Industry

Short Railroad in Michigan Does Trick

An interurban railway line boasting of only 8 miles has reversed the usual order of things by threatening to run a bus line out of business. It is the United Suburban Railway "the shortest railroad with the longest list of stockholders in the United States" that has turned the trick. Started in July, 1927, with 700 stockholders, the line runs from Grand Rapids, Mich., southwest to the village of Jenison, Mich. A bus line has covered the same route for the past few years but offered its equipment and franchise to the railroad this month for \$57,000. The stockholders see little value in purchasing the line.

In 1926 the Grand Rapids, Holland & Chicago Railroad succumbed to the competition of the bus lines. With the passing of this road the residents of the territory between Grand Rapids and Jenison had no means of transportation. The bus line service did not satisfy and finally the commuters decided to own their own service.

Five cars were ordered from New York City and on July 17, 1927, using the defunct road, the first trips were made. Later it was found necessary to lease an additional car from the Grand Rapids Railroad, and early this year two more new cars were ordered from the East.

At the first annual meeting of the stockholders the books showed a profit of \$2,950 for seven months of operation. Each succeeding month has shown an improvement. December, with its heavy holiday traffic, was expected to top the list, but its high mark was exceeded by January, which in turn was surpassed by February.

Hope is held out that the initial cash dividend would be paid next year. However, the 700 stockholders who reside along the right-of-way feel that they are receiving substantial dividends through increased property values since the resumption of operations.

Toronto Men Want New Agreement

Features of a new agreement shortly to be submitted by the employees of the Toronto Transportation Commission, Toronto, Ont., are a clause to give all employees two weeks' annual vacation with pay, and an increased schedule of wages for the maintenance department. With the exception of a proposed increase to maintenance men and the request for two weeks' vacation with pay, the new agreement differs little from the present, which expires March 31. The employees take

the position that since they are in the employ of the city they are as much entitled to a vacation without any penalty as are other city employees.

The agreement will be for two years. It will probably not be dealt with before General Manager Harvey's return from England.

Talk of Lackawanna Electrification Revived

Representatives of 23 North Jersey civic organizations on March 27 told J. M. Davis, president of the Delaware, Lackawanna & Western Railroad, that they would use their influence to in-

crease commutation fares if his company would electrify its lines to commuting communities. The project of electrifying these lines has been talked of for twenty years, but this was the first time that spokesmen for the public involved have come forward to aid the project. Mr. Davis said he would give the suggestions that have been made serious consideration.

It is proposed to operate trains electrically on 75 miles of road. These would include the lines from Hoboken to Montclair, Dover and Bernardsville. The cost would be about \$13,000,000 if the railroad bought power from outside interests or \$17,000,000 if it constructed its own generating plant.

Mr. Mitten and Amalgamated Negotiate

Conditions in Philadelphia and Buffalo to remain as at present so far as organization activities are concerned. Two-thirds secret vote will fix policy on any new lines

ANNOUNCEMENT was made on March 28 that Mitten Management, Inc., had reached an agreement with the Amalgamated Association for union labor co-operation where Mitten Management in the future may acquire or operate any transportation system, providing two-thirds of the employees of the system by secret vote agree.

Mitten Management, Inc., of which Thomas E. Mitten is the head, manages the operation of the Philadelphia Rapid Transit Company system and the operation of the International Railway system at Buffalo, but these companies are not affected by the agreement.

The agreement was reached after a series of conferences in Atlantic City among Thomas E. Mitten and his son, Dr. A. A. Mitten, chairman of the boards of the Philadelphia Rapid Transit Company and the International Railway, and W. D. Mahon, president of the Amalgamated Association; his son, O. L. Mahon; L. D. Bland, treasurer, and P. J. Shea, vice-president of the Amalgamated. The conference was arranged by W. Jett Lauck, a labor economist and former secretary of the War Labor Board.

The full memorandum of the union-management agreement, dated March 25, follows:

Mitten Management reiterates its desire to deal with organized labor whenever and wherever any union organization will undertake to co-operate for increased economic efficiency and where two-thirds of the employees, by secret ballot, may so elect.

Mahon and associates, speaking for the Amalgamated Association of Street and Electric Railway Employees of America, being also desirous of co-operating in economic accomplishment and of aiding their

membership to a 50-50 participation in the rewards rightfully paid to men and management, in addition to the present wages paid, have now come to an understanding with Mitten Management, Inc., by which the following procedure will hereafter govern both parties:

The P. R. T. Co-operative Plan of 1926 shall be made effective with the union covering such system, or departments of a system, as the union may designate, after two-thirds of such employees shall have so determined by secret ballot, it being fully understood that the right to organize is a fundamental right of labor which should not and cannot be permanently abridged or denied, but it is now understood and agreed that the activities of the Amalgamated in this respect shall be restricted to properties that are to be acquired or operated by Mitten Management in the future.

So far as Philadelphia and Buffalo are concerned, conditions there are to remain as at present in so far as organization activities are concerned, it being desirable that the situation on these properties shall remain as at present in order that the standard of economic excellence of these companies now being operated by Mitten Management be the standard by which union performance in co-operating with Mitten Management on other properties shall be measured. When co-operation between the Amalgamated and Mitten Management has developed to a point where the results are equal to those obtained on these properties, the matter of union-management agreements on these properties may be discussed and be made the basis of further agreement.

Working agreements including standards of work and compensation to be matter of local arrangement and ratification. Collective consideration to be upon the basis of group representation through branch, departmental and general committees, with recourse to arbitration in case of failure of agreement. Before arbitration shall be re-

sorted to, however, the matter under discussion shall be submitted to two representatives of the International Association and two representatives of Mitten Management for review and attempted settlement. Failing agreement one arbitrator for employee and one arbitrator for employer shall be chosen, these to select a third. If these two arbitrators are unable to agree upon the third arbitrator then the Public Service Commission shall act as the third arbitrator.

Contract shall run during delivery of co-operative effectiveness, which is understood to mean that degree of assistance in securing the result on the property in question as secured by Mitten Management on the properties operated by them at this date. Non-performance by either party to be settled through arbitration. Contract may be terminated by vote—secret ballot—of two-thirds of the employees represented by the organization. Operating company and union each to supply, at their own cost, their representatives on the 50-50 collective consideration committees, also each its own secretary. Operating company and union to share equally in the office and operating expenses as mutually decided. Operating company to, where two-thirds of the employees so vote, collect by check-off system and pay to organization such amounts as the organization may from time to time decide. All the employees of the departments involved to be so assessed. Funeral, disability, old age and all other benefits to be undertaken by the union, for which operating company will pay union \$1 per month per man.

In addition to the usual results of collective consideration, it is the further object of this arrangement to secure for all interested parties the advantages of collective effort and accomplishment. To the owners this will mean a fair return on their property; to the public an adequate and efficient system of transportation; and to employees, in addition to wages sufficient for the necessities of life, comfort and savings, an opportunity to participate in increased earnings made possible by their increased effort and productive efficiencies. Mitten Management and Amalgamated Association are agreed that the same 50-50 participation shall be effective between "management and union" as now exists between "management and men," and the sense of this agreement is that both shall supply the same degree of co-operation and both similarly shall participate in the results secured therefrom.

It is explained that T. E. Mitten and W. D. Mahon have been seeking industrial peace for more than 30 years. Each has always had great respect and admiration for the other. Yet more than half the time each has been obliged to fight the other by the force of the powers to which Mr. Mahon owned his leadership as president of the Amalgamated and Mr. Mitten his position representing capital.

Twenty years ago Mr. Mitten endeavored to secure co-operation as between capital and labor, but "neither the force let by Mr. Mahon nor the capital represented by Mr. Mitten could be brought each to trust the other at Chicago, and Mr. Mitten came East in 1911 to try his 50-50 plan as between labor and capital in Philadelphia where it was fully intended by Mr. Mitten and Mr. Mahon that the union and company would co-operate."

The P. R. T. co-operative plan of 1911 was signed and all looked well, but insurgents in the forces of organized

labor caused it to fail in polling the agreed two-thirds vote. Then came sniping by labor at Mr. Mitten, who for the past fifteen years "has been forced to fight off organized labor and against conservative capital to protect his 50-50 plan, which is now generally admitted to have proved beneficial alike to employees, owners and public." In conclusion an official statement said:

"All's well that ends well" and "everything happens for the best" are old and trite sayings. These have proved true here. Capital has now capitulated, and had Mr. Mitten and had Mr. Mahon worked together from 1911 forward as planned, their very association would have encouraged radical labor and reactionary capital to such opposition as would have made impossible the wonderful results secured by Mr. Mitten and the men of Philadelphia and Buffalo. These two cities, independently operated, can be now used as a measuring stick for results to be obtained wherever Mitten Management and organized labor can be combined.

This resolution, dealing with the Mitten-Mahon agreement, was adopted by the employee committee men of P. R. T., on March 27.

Whereas Mitten Management has made a formal agreement with the Amalgamated Association covering future relations; and

Whereas the basis of this agreement is the policy of men and management co-operation and fair dealing which has since 1911 guided the activities of men and management on P.R.T. system; and

Whereas this agreement in no way affects the present relationship between P.R.T. employees and Mitten Management under the co-operative plan, but on the contrary makes the men of P.R.T. system, with independent operation, the pattern of co-operative efficiency by which future Union-Management accomplishment will be measured: Therefore be it

Resolved, that the joint convention of employee and employer committees of the Philadelphia Rapid Transit Company obligate themselves jointly to maintain such a continuing degree of excellence in co-operative efficiency as will well justify the confidence thus expressed in us. And be it further

Resolved, that we indorse this agreement and extend to Mitten Management our congratulations on this accomplishment which, after many years of misunderstanding, indicates the acceptance by organized labor in the street railway industry of the fundamental principles of the Mitten plan.

Uniform Franchise Expiration Sought

An application has been filed with the City Council by the Spokane, Coeur d'Alene & Palouse Railway, Spokane, Wash., the Great Northern subsidiary owning and operating the former Inland electric railway system, asking that its franchise on Main Avenue, between Washington and Wall, be extended until 1930 in keeping with the expiration dates of other franchises held on that street. The company is not operating electric cars over this part of its line, but has leased the trackage to the Spokane United Railways. It has three franchises on Main Avenue, and wants a common date of expiration for all of them.

Progress on Merriam-Shawnee Line

Officials of the old Hocker Line, christened the Kansas City, Merriam & Shawnee Railroad, are planning to rush its opening. Work of putting back that part which was torn up after the line was sold last winter is expected to start immediately.

The new line has been granted a charter and has applied to the Public Service Commission to operate from Eighth Avenue and Southwest Boulevard in Kansas City, Kan., through Merriam and Shawnee to Rose Hill. The reorganized company may be able to resume service about Easter.

Fare Increase in Los Angeles Denied

Holding the 5-cent fare of the Los Angeles Railway, Los Angeles, Cal., to be "not unreasonable" the California State Railroad Commission in a decision made public on March 26 unanimously denied the company's application for an increase from the present 5-cent fare to a 7-cent fare or four rides for 25 cents. Application for the increase was made to the commission on Nov. 17, 1926. A valuation of the properties made by the commission was declared to amount to \$42,000,000. This was used as a rate base. The figure includes undepreciated cost of properties with land at present values; also an allowance of \$750,000 for materials and supplies on hand and of \$250,000 for work in progress.

In its decision the commission declared the net earnings for 1927 to be \$2,070,261 or 4.9 per cent on the rate base of \$42,000,000. The commission held that this return had been earned in spite of the fact that the company had made no effort to take advantage of possible economies pointed out by the commission at previous hearings on the question.

Commissioner Carr in a separate but concurring opinion declared that this was the second time that the Los Angeles Railway Corporation had applied to the commission for permission to depart from the 5-cent fare and enter upon what he termed "the uncharted sea of multi-coin fares," this referring to the proposal to issue tokens at the rate of four rides for 25 cents. He pointed out that on May 31, 1921, the commission issued an order permitting the company to charge a 6-cent fare with ten tokens or tickets for 50 cents, under certain conditions which the company did not accept. He added that during the period 1921-1927 under the 5-cent fare, the company realized average net earnings of 6.6 per cent. The fluctuations, the commissioner continued, indicate the danger of attempting to arrive at a satisfactory conclusion as to rates based upon the experience of as short a period as one or two years. He said he believed there was no convincing evidence that the present cycle of low earnings was permanent.

Graveyard Fires in Worcester and Springfield

Under the plan of the New York, New Haven & Hartford Railroad for the thorough rehabilitation of the railway properties in both Worcester and Springfield, Mass., a group of 130 cars was burned recently in Worcester. This group is part of 189 cars burned during the last two weeks. The grand total of cars in Worcester sold for scrap and to be burned is 375. In addition 128 obsolete cars formerly operated in Springfield are to be fed to the flames.

As has been noted before in the *ELECTRIC RAILWAY JOURNAL*, the program of burning old equipment is part of the process of putting the Springfield and the Worcester properties in first-class operating condition by the purchase of new cars, reconstruction of track, building of a new carhouse and garage in Worcester and the elimination of all facilities that cannot be rehabilitated and put into efficient operating condition.

The final chapter that made possible the program now being carried out at Worcester and Springfield was written early in January, 1927, when the Public Utilities Commission of Massachusetts approved the acquisition of stock of the New England Investment & Security Company by the New York, New Haven & Hartford Railroad. The commission at that time approved the acquisition of \$300,000 of first mortgage bonds of the Springfield Street Railway, authorized the issue of shares of preferred stock of the New England Investment & Security Company and authorized the acquisition of outstanding shares of the common stock of the New England Company.

Almost immediately thereafter the New Haven Railroad entered upon the program of rehabilitation calling for the expenditure of many millions of dollars on these properties that is now fast being brought to completion. Included in that program has been the realignment of the systems in both cities with the 'lopping off' of many railway branches operated in territory sparsely settled and the substitution of bus lines for them with subsequent co-ordination of both railway and bus lines on a scale



A hook-up with the past unloosed

perhaps never before attempted in cities situated similarly to the two very thriving industrial communities of Massachusetts served respectively by the Worcester Consolidated Street Railway and the Springfield Street Railway.

Would Appeal Frankfort Ordinances

An appeal from two city ordinances at Frankfort, Ind., was taken on Feb. 23 by the Terre Haute, Indianapolis & Eastern Traction Company in petitions filed with the Indiana Public Service Commission, protesting against the speed limit of 4 m.p.h., that has been fixed by the City Council in Frankfort and other regulations pertaining to track repairs. The railway was recently ordered to pave between its tracks and because of failure to do this, the Council, it is said, passed the speed regulation as a retaliatory measure.

Interborough Not to Appeal Decision in Labor Suit

James L. Quackenbush, general counsel for the Interborough Rapid Transit Company, New York, on March 23 notified Nathan D. Perlman, counsel for the Amalgamated and other labor bodies, by letter that he had decided not to appeal from the decision of Supreme Court Justice Wasservogel denying the company the restraining orders sought. The Interborough has dismissed most of its employees who joined the union and the labor organizations failed to carry out strike threats.

Terminable Permit Bills Signed by New York Governor

Governor Smith, of New York, has approved the two Thayer bills, the one amending the transportation corporations law, to provide for terminable permits for stage, omnibus and motor vehicle lines, as chapter 717 of the laws of 1928, and the other amending the railroad law, to accomplish the same purpose for street surface railroads, as chapter 733 of the laws of 1928. The bills provide that every city, town or village, in addition to other powers now conferred on them by law, shall have power to grant to street railways and to bus corporations a terminable permit to occupy and use its streets.

Every such municipality shall have power to enter into an agreement for the purchase of and to acquire by purchase all or any part of the property, plant and equipment of such a corporation actually used and useful for the convenience of the public, operating under terminable permit, and upon purchase thereof to operate, or to contract with any person, firm or corporation for the operation thereof. Power is also granted to the municipality to amend any existing license, grant, franchise or permit, or any of the conditions thereof, whether granted by municipal authority or directly or indirectly by the state or otherwise, or any consent of local authorities, or any of the terms, provisions or conditions thereof, relating to construction or operation.

Every terminable permit and every amendment to any existing license, grant, franchise, permit or consent in-



One horseman fire visits Worcester

corporating therein the terms of a terminable permit, shall contain an irrevocable option for the purchase by the city, town or village, either directly or through its nominee or nominees, of all or any part of the property of the transportation corporation.

All terminable permits and amendments thereto are to be subject to the approval of the Public Service Commission or the Transit Commission.

It has been hinted that the immediate effect of the bill will be to further a proposal to reorganize the surface transportation of Brooklyn in order to overcome the city's objection to inclusion of surface railway lines in a comprehensive unification plan.

Wage Hearing in Fort Wayne

A hearing was held in the Allen County Courthouse, Fort Wayne, Ind., on Feb. 27 before Commissioner Harvey Harmon at which operators and officials of the Indiana Service Corporation presented their arguments on the employees' petition for an increase in wages. The men, who had asked the Public Service Commission for a hearing, contended that the wage scale at present was inadequate and the company stated that business conditions and a general falling off of electric railway revenues made it impossible at the present time to grant the requested increase. Following the taking of testimony from the men and the company the commissioner said that a later date would be set for oral arguments before the full commission.

Crash on Long Island Injures More than a Score

A twelve-car train of the Long Island Railroad left the rails in the Sunnyside Yards in Long Island City on March 28 at 8:15 a.m., bringing serious injury to four, lesser hurts to 30 more, and ripped up 600 ft. of roadway, bringing commuters to their offices late and demoralizing traffic on the road throughout the day. Four investigations are under way as to the cause of the wreck. The derailed train was made up of sections coming from Speonk and from Long Beach combined at Jamaica.

New York City to Try to Recover Subways

The Board of Estimate of New York voted on March 29 to sue the Interborough Rapid Transit Company for the return of the city-owned subways as the city's answer to the Interborough's attempt to raise the fare to 7 cents. The counter suit was not started, however, because a federal court decision which former Comptroller Charles L. Craig, the city's new special counsel, is awaiting was put off until April 2, at which time a hearing before the Federal Statutory Court, scheduled for March 29, will also be held.

\$75 for Best Design in St. Louis

Miss Florence Boeffer, St. Louis, Mo., a student in the Fine Arts School of Washington University, submitted the design which will be used by the St. Louis Public Service Company to mark all its street cars and insignia. She won the first prize of \$75 in the contest conducted by the company among the students of Washington University. Miss Roberta Shine won the second prize of



Prize winning design

\$50, while the third prize of \$25 went to Fred Dreher. More than sixty students participated and some submitted as many as fifteen designs.

The design is suitable for use on cars and motor buses, on badges of conductors, motormen and chauffeurs and on caps and uniform buttons as well as for stationery and other printed matter.

Still Dallying with Boston "L" Legislation

There are no clear-cut lines yet for the form that the Boston Elevated Railway legislation may take this year, although the matter has been before the Massachusetts Legislature almost daily since its opening. Opinion sways with the wind. From present indications it seems likely there will be no Elevated legislation, though Governor Fuller has stated more than once that he will keep the Legislature in session all summer, if necessary, to straighten out the Elevated situation.

It is quite clear that no public control bill can get through the house and no public ownership bill can get through the senate. Both branches are opposed to returning the road to the stockholders. On the other hand, the Committee on Metropolitan Affairs and Street Railways has voted, fifteen to fourteen, to report a bill for public ownership, but some of the members who voted with the majority are known to have done so merely to break the deadlock and are not in favor of public ownership.

Matthew C. Brush, president of the American International Corporation, New York, and former president of the Boston Elevated Railway, was in Boston during the week ended March 24 and delivered a bristling address before the Boston Chamber of Commerce, in the course of which he rejected as useless all the propositions that have been raised before the Legislature this year. Among other things he said:

You have an impossible situation over the Elevated Railway problem. You haven't suggested a solution up to 12:30 p.m. to-

day. I have no suggestion to make. But I do advise you not to rush into a solution until you are dead sure you are right. A hurry-up job is worse than none at all.

The statement in the interview attributed to Mr. Brush to the effect that the road could be run profitably on a 6-cent fare has since been denied.

New Franchise Sought in Wichita, Kan.

The Wichita Transportation Company, controlling both street cars and buses in Wichita, Kan., has asked the city commission for a new franchise. In return, the corporation promised the highest efficiency possible in transportation and the directors pledged themselves to fight with the commission for a return of "home rule" over buses to Wichita.

Robert C. Foulston, attorney for the carriers, explained at the start that his board of directors had decided that it was best that control over both street cars and buses be vested in the city.

The terms of the franchise were then discussed. The new franchise would run for twenty years. The carrier would have the right to supplement and extend its lines by automotive equipment as it became necessary and the commission would have the right to demand such extensions as it deemed necessary. The City Commission, by right of the ordinance, could fix the bus and car fares, but should not deny the company the right to earn 8 per cent, with any excess over that amount to be applied to the reduction of fares.

At the start, both bus and car fares would be 8 cents for one fare, 15 cents for two, 35 cents for five and \$1.50 for 24 fares, with the universal transfer system in force.

There would be co-ordination between cars and buses with competitive elements eliminated. The city would retain the right to purchase the transportation system any time that it desired, providing a fair price was paid for the properties. Mr. Foulston was unable to state the value of the system, but he gave the combined property account at about \$3,000,000. As to the financial condition of the company now, it was said that there are \$1,490,000 in first mortgage bonds, \$300,000 in 7 per cent preferred stock and \$500,000 of preferred stock in the Wichita Transportation Company, recently floated to buy the independents, build a garage and add new equipment. There was a floating indebtedness which he could not describe as to amount.

Mr. Foulston stated that only one year remains for Howard Wheeler, R. C. Clevenger, R. B. Campbell and associates to finance the local transportation system which they plan to take over from the Illinois Power & Light Corporation. The franchise is considered necessary if this financing is to be consummated. He said there will be 20,000 shares in the new system. A total of 4,000 shares will be held by the Illinois Power & Light Corporation and 16,000 will be in the hands of the local cap-

italists. They must refinance the 16,000 shares by next March 1 to get the properties.

Mayor A. J. Coombs has indicated that an early answer may be expected from the city.

Valuation Figures in Madison Vary

In connection with the valuation news about the Madison Railways contained in the article in the JOURNAL for Feb. 11, page 252, it should be explained that the Railroad Commission of Wisconsin, in a late hearing, valued the property on the basis of reproduction new at \$1,559,089 and less depreciation at \$1,268,096 whereas the expert engineers of the company in valuation proceedings valued the property in detail with each item clearly set forth at \$2,188,501 and less depreciation at \$1,960,216.

It is understood that the company considers the valuation placed upon its property by the Railroad Commission engineers very much less than any court of equity would approve. In the meantime it has accepted in good faith the ruling of the commission with reference to fares in the hope that the outcome will be mutually satisfactory to the company, the city, and the commission.

Another Move in Baltimore Fare Case

The People's Corporation at Baltimore, Md., has asked the courts to set aside the Public Service Commission's decision granting the United Railways a 9-cent cash fare with three tokens for a quarter and return to the old 8-cent rate with two tokens for 15 cents.

The appeal from the commission's February ruling was filed in Circuit Court No. 2 by Linwood L. Clark, counsel for the People's Corporation. The People's Corporation, according to Mr. Clark, is composed of numerous civic organizations having a combined membership of 300,000.

Counsel for the United already has carried to the same court its appeal for a straight 10-cent fare which the company asked in its petition to the commission last August.

Need of Increased Fare for St. Louis Stressed

Unless the fare increase sought by the St. Louis Public Service Company, St. Louis, Mo., is granted by the Missouri Public Service Commission it will be impossible to maintain the railway system on the present 80 per cent efficiency basis according to a brief of the company filed with the commission on March 9. The company seeks a straight 8-cent fare for adults, this rate to be based upon a property valuation of \$75,000,000. This fare would net the company approximately \$2,000,000 which is only 6 per cent on the valuation claimed. Refusal of the increase requested would, the brief says, "drive the company into

a pecuniary decrepitude which would result in another receivership, and the property and equipment would fall into a condition of disrepair which could only be corrected after the lapse of many years and the expenditure of many millions."

The city in its brief contends the valuation of the company's properties should not exceed \$53,000,000. This is only \$1,000,000 greater than the tentative valuation fixed by the commission pending the completion of the rate case. It was the contention of the company that the reproduction value of its property would be \$98,573,000. The rate case has been before the commission since June, 1926.

Grand Rapids Solicits Suggestions

Employees of the Grand Rapids Railroad, Grand Rapids, Mich., are asked through the columns of *The Token*, the official paper of the company, to submit their ideas on the betterment of service and working conditions for their own benefit and the benefit of patrons. The men are asked to drop suggestions in the suggestion box in the carhouse, shop or general office and not to let an idea slip away, go undeveloped or unknown where it might do the company and others much good. In the February issue of the paper awards are announced for such suggestions as coat hooks on cars for operators' overcoats, blanks for operators' use in caring for mistakes of passengers in farebox errors, and many others.

Wages in Memphis Unchanged

Wages on the Memphis Street Railway, Memphis, Tenn., shall remain unchanged the board of arbitration decided on March 23. Declaring the present scale a satisfactory one the board denied the union's demand for a 9½-cent increase and the company's demand for a 7½-cent decrease. For one-man car operators the men sought an increase in the differential from 5 cents to 20 cents. This finding becomes effective on April 1. A. B. Galloway, representative of the union, dissented from the majority report, signed by W. A. Ransom, chairman and neutral member, and Frank N. Fisher, company member.

Back of the proceedings just ended are many months of almost continuous negotiation by both union and employers for changes in the wage scales. In the spring of 1926 an arbitration board granted the men an increase in hourly wages of 2½ cents. That scale which is continued, provides 47.5 cents an hour for men who have worked with the railway for less than two years, 52.5 cents an hour after the second year, and a top wage of 57.5 cents an hour for three-year or more men.

T. H. Tutwiler, president and general manager of the railway, says the company will make a new contract "upon a reasonable and satisfactory basis."

Hearing on Chicago "L" Increase on April 28

Consideration by the Illinois Commerce Commission of the Chicago Rapid Transit Company's application for an increase in fares, which began in Chicago on March 15 with the presentation of evidence by the company, has been postponed until April 28. The company is asking to have the \$1.25 weekly pass and the three-for-a-quarter ticket rate abolished, leaving only a straight 10-cent cash fare.

H. J. Dunbaugh, attorney for the Rapid Transit Lines, explained that the company is receiving a return of about 3½ per cent on its investment, while the commission itself has held that a return of 7½ per cent would be fair. The proposed increase will bring the company's return up to only 6 per cent.

Mr. Dunbaugh recalled that in 1919 the Illinois Commerce Commission found the value of the Rapid Transit Lines properties to be \$86,250,000. However, since that time, he contended the value had increased nearly \$10,000,000. Harley Johnson, general manager, testified that wage increases since 1922 had totaled \$1,251,339.

In deferring the hearings until after the April primaries, David H. Jackson, chairman of the commission, has allowed the city more time in which to prepare its testimony.

Right-of-Way of Chicago & Southern Becomes Highway

The Will County board of supervisors has just concluded negotiations for the purchase of the right-of-way from the Kankakee County line north to Monee, a distance of 6½ miles, formerly used by the Chicago & Southern Traction Company. Paralleling this strip must come an additional 40 ft., being purchased from land owners. This will supply the 90 ft. necessary for the construction of the new super-highway by the state of Illinois between Kankakee and Chicago, the first stretch of 4 miles, extending from Kankakee to the north, being under construction by the state. The railway suspended 2 years ago.

Dispute Ends Amicably in Winnipeg

A dispute in Winnipeg, Man., Canada, over the dismissal of a conductor of the Winnipeg Electric Company has been settled without the threatened strike. Through the efforts of two members of the Conciliation Department and Hon. Peter Heenan, minister of labor, and A. W. McLimont, president of the company, negotiations were opened and the men's committee agreed to have the conductor reinstated in some capacity other than that of conductor. The company maintained that since it was misconduct on the part of an employee it was therefore a matter of discipline and required no board of conciliation. Conciliation proceedings were set up under the industrial disputes act by the Canadian Government.

No Date Set for Public Utility Hearings

The Federal Trade Commission states that the date for beginning public hearings in connection with inquiry into public utilities has not been definitely decided. Commissioner McCulloch, who authorized the statement, said every effort was being made to speed the day when the session will be started.

Commissioner McCulloch's interpretation of the Senate resolution is that while the Senate prescribed an investigation of a public nature, "it intended that we make preliminary inquiry and collect facts upon which to base our evidence for introduction at the hearings. Thus the whole inquiry falls naturally under two headings, general investigation and public hearings."

He added that he was anxious to begin the public hearings in the utilities investigation at the earliest possible moment, but that so far the commission had not reached the stage where it was ready to proceed.

The preliminary inquiry now in process has generally to do with business and financial facts on the one side and the question of alleged propaganda and influencing of elections on the other.

A. G. Mott Defends Zone Fare for Key System

Defending his 5-cent zone fare plan, which the Key System Transit Company, Oakland, Cal., is opposing, A. G. Mott, chief engineer of the California Railroad Commission, occupied the stand the entire day at the rate hearing before Commissioner Clyde Seavey on March 21 in San Francisco. Operation of street cars under his plan, Mr. Mott declared, would increase the company's annual revenue anywhere from \$134,000 to \$834,000. The engineer further asserted that a rate increase would result in a decrease in patronage that would bring about curtailment in service followed by a further patronage decrease. He estimated that a rate increase from 5 to 6 cents would bring a 20 per cent patronage loss, an increase to 7 cents a 40 per cent loss, and an increase to 10 cents a 73 per cent loss.

The cross-examination of Engineer Mott was resumed on March 24. This rate hearing has been going on intermittently for three months and is now nearing the end. Key System officials contend that operation of the Mott 5-cent zone plan would force the road into bankruptcy. The company wants a 10-cent fare with \$1 weekly passes.

Illmo Limited in Operation

The Illinois Traction System has added two parlor-car trains to its fleet between St. Louis and Peoria. The new trains are known as the Illmo Limited. The trains are dispatched from St. Louis and Peoria, Ill., at 10 a.m. daily, making the run in five hours.

Recent Bus Developments

Detroit Operation Raises Storm

Purchase of additional vehicles must await special report. Inquiry into results of present operation

THE Detroit Street Railway Commission has ordered a complete survey of the department's bus system under supervision of William B. Mayo, chief engineer of the Ford Motor Company and consulting engineer of the department. Until this survey, which will study the department's methods of bus cost accounting, the commission decided to defer considering purchase of additional buses.

Commissioner Barlum called the meeting to order at which this decision was made. Commissioner John J. Gorman is reported to have then said:

I hope my criticism won't be taken as a reflection on the manager, but I haven't had a good reason presented to me why these additional buses should be purchased. Likewise I have heard no description of where they are to be used. I have made an investigation and I find that the department has a lot to learn about bus operation.

We should know costs. Our statement shows that it costs 24 cents a mile to operate buses, while, as a matter of fact, the cost is nearer 34 cents a mile. There are many things, such as cost of supervision, pro rata share of overhead on shop equipment and other similar items, that are not charged against bus operation. We have no definite figures.

Isn't this going too fast? As our finances are nothing to brag about, wouldn't it be wise to hire outside aid to investigate the department's bus situation? The Woodward Avenue line lost \$80,000 a year. Out of 43 lines, only fifteen show a profit under the department's own figures. Obviously we need buses, but we should postpone buying more until we investigate.

"I'm told our shop methods are lax. We don't know definite costs. We are groping in the dark about the operating costs of the eleven or twelve different type buses. I haven't talked with any one in the department who has practical experience in operating buses.

General Manager Smith, of the department is said to have replied:

The double-deck buses, purchased eighteen months ago, I had nothing to do with. They are obsolete now and we can't forecast what type of bus is to come three years hence. I don't think we can defer enlarging our system. The new buses will be used on Chalmers and Livernois Avenues, the two fastest growing lines in Detroit. Our bus traffic has grown from a few thousand to upward of 37,000,000 passengers last year. You can bring in a staff of reputable engineers and if they don't tell you that the buses are operated economically, I'll resign. There has been a lot of misinformation and not enough real information handed around.

After Mayor Lodge intervened, Mr. Smith continued to answer questions of both commissioners with the statement that "bus costs might be a shade more than is shown in the auditor's figures,"

and Mr. Barlum retorted: "If we don't get costs of bus operation, we had better get new auditors." Mr. Smith also stated that cost figures on each type of bus are being segregated now.

The Mayor is quoted as follows:

Shortly after election, I studied the audits of Mr. Hauser and Price-Waterhouse and came to the conclusion that, if possible, I would have an entirely neutral firm take the two audits and reconcile them. Ralph Stone, of the Detroit Trust Company, consented to do this and his report will be ready about May 1. There was no use for me to do this and I wanted some one whom the public had confidence. Until May, we won't be in any position to talk about accounting.

As to bus operation, I don't believe the D. S. R. general manager wants to do anything unnecessary and I am glad that Mr. Gorman has raised his questions. I should like to have the survey made for me and also for Mr. Smith. And Mr. Smith, I should like to have you consider carefully the question of turning the D. S. R. purchasing department over to the city purchasing department.

Sale of Louisville Franchise Set

Mayor Harrison of Louisville, Ky., affixed his signature to the bus franchise ordinance he sponsored and which had passed the Board of Aldermen on March 20. The ordinance was passed without a dissenting vote. John Chandler, attorney for the jitney bus operators, and George C. Burton, representing labor interests, opposed the measure. On March 22 the Board of Public Works announced that the bus franchise provided for in the new ordinance would be sold at public auction on April 2. The sale is regarded as a matter of form since the ordinance was drawn with a view to the acquisition of the franchise by the Louisville Railway.

Shore Line Operating Offices Removed to Hammond, Ind.

J. C. Johnson, general manager of the Shore Line Motor Coach Company, a subsidiary of the Chicago, South Shore & South Bend Railroad, and a large mechanical and operating personnel were removed recently from Michigan City and are now housed in the company's new garage and office building in Hammond, Ind. Removal of the company's headquarters from Michigan City to the more central point on the system was effected because of the sale last December of the Shore Line routes from Chicago to Detroit and from Benton Harbor north to Muskegon, Mich., to the Motor Transit Corporation of Chicago. The service between Chicago and Benton Harbor is still maintained, however. A small staff and office is still retained in Michigan City to handle the Benton Harbor division.

Operators in Cleveland Rewarded for Safety Records

Morse W. Rew, superintendent of the motor coach department of the Cleveland Railway, Cleveland, Ohio, at a dinner at the Winton Hotel in that city on March 16 made the first awards of this kind to 98 men who had operated three months without a chargeable accident. As chairman of the evening Mr. Rew introduced Judge Skeel, president of the Cleveland Safety Council, who talked to the coach drivers on the part that safety plays in safe driving. Earl J. Harrington, superintendent of accident prevention division, also talked briefly on the relationship of accident prevention to operation of coaches.

An outstanding fact was that eight of the drivers operated during the period of three months without any accident, either chargeable or non-chargeable. Should these men continue this record for one year, they will receive a certificate symbolic of their good operating record.

As a means of promoting safe operation a committee of coach drivers recommended to the management on Nov. 1, 1927, that awards be made to the coach drivers who operate without chargeable accidents. The recommendation was approved, and awards were arranged upon the following basis:

Bronze safety pins for those drivers who operate three months without chargeable accidents.

Silver safety pins for those drivers who operate six months without chargeable accidents.

Gold safety pins for those drivers who operate one year without chargeable accidents.

It was in accordance with this plan that the first awards were made on March 16.

Buses to St. Louis Zoo

The St. Louis Public Service Company, St. Louis, Mo., has been granted permission to operate buses on Sundays and holidays along Kingshighway from Manchester to Oakland Avenue. The buses will replace the one-man street cars heretofore used on this stretch during the Summer months when the Taylor Avenue division runs direct to Forest Park Highlands amusement park and the Zoo in Forest Park.

New Move in St. Paul Following Voters' Action

Voters at St. Paul, Minn., will have submitted to them for action at the election on May 1 a proposed charter amendment authorizing the city to engage in bus transportation. The draft of the amendment was voted unanimously for submission March 22 by members of the City Council. For passage the amendment must receive a favorable vote of 60 per cent of the ballots cast at the election. This action follows refusal of the voters at the last election to adopt an amendment allowing the

City Council to vote expense relief suggested by the Minnesota Railroad & Warehouse Commission to enable the St. Paul City Railway to come nearer the $7\frac{1}{2}$ per cent return on its valuation authorized by the commission. This included cost of paving between tracks where the streets are already paved. The company has before the commission application for an increased rate of fare, now 8 cents or six tokens for 40 cents.

New Interstate Bus Bill Introduced

Measure now before House represents legislation regarded as not too restrictive yet sufficiently protective

CONGRESSMAN PARKER, chairman of the House committee on interstate and foreign commerce, introduced on March 24 H.R. 12380 as a substitute for his bill H.R. 5640 and, with the consent of Mr. Denison, as a substitute for H.R. 19. This bill was introduced at the request of a legislative subcommittee of the bus division of the American Automobile Association which, under the instructions of the bus board and bus division legislative committee, has since Dec. 2, 1927, been negotiating with all the interests concerned in an attempt to get a bill satisfactory to everybody which would stand a good chance of passage at this session.

In the opinion of the bus board and legislative committee, H.R. 12380 represents more perfectly the viewpoint of the bus operators in the bus division than did the Denison bill, and, at the same time, it has the approval of the American Electric Railway Association, the American Association of Railway Executives, and, informally, pending an official meeting of its legislative committee, the approval of the National Association of Railroad and Utilities Commissioners. The bill also includes several recommendations which were made by the National Automobile Chamber of Commerce at meetings between representatives of that organization and the bus board in Washington on Nov. 11 and Dec. 2.

The chief changes in H.R. 12380 over Mr. Denison's bill are as follows:

1. The two classifications have been omitted and the term "motor carrier" redrafted to take care of this change.

2. The "grandfather" clause has been changed from March 3, 1925, to one year prior to the opening day of the legislative session at which the act is passed.

3. The provision for a suspension of rates during the time when hearings are being held on a protested rate has been omitted. The regulating agencies, under the terms of the act as now written, are without authority to suspend a rate pending the outcome of a controversy.

4. The different matters which under the old bill the board or commission was required to take into consideration before granting a certificate of convenience and necessity have been cut down to a statement that, among other pertinent matters, the board or commission shall give reasonable consideration to the public convenience of and necessity for the transportation

proposed and to existing available transportation agencies and service.

These represent the major changes. The only other change to be noted is that the excess phraseology in the bill has been eliminated and where the Denison bill ran to 25 pages, H.R. 12380 runs to only 20 pages. In drafting the bill every effort was made to follow to the closest degree possible the recommendations which were made to the Interstate Commerce Commission at the time of the oral argument on the examiner's tentative report in docket No. 18,300, held at the commission's office on Feb. 10.

No definite information as to hearings on interstate legislation is forthcoming as yet except that whatever hearings are held will be on H.R. 12380 and will not involve anything directly or indirectly connected with motor truck transportation. In an informal statement made to representatives of the bus division on March 28, Mr. Parker said that he would do everything he possibly could to have the committee take early action and he thought that hearings might be held the first or second week in April. At least a week's notice of the date which the committee would set for hearings has been assured. An official statement says:

The bill as it now stands is simple in form and covers all the fundamentals of regulation. Everybody participating in the conferences at which the bill was drafted was agreed that the bus should be given every opportunity to develop along sound, healthful lines and, except for those provisions necessary for the protection of a certificate, no attempt was made by anybody to insert anything which could be construed as being at all restrictive.

Governor Signs New Jersey Bus Bill

Governor Moore of New Jersey has approved Senator Wolber's bill, senate 204, authorizing the substitution of buses for trolley cars, and extending the Public Utility Commission's control over corporations operating both railways and buses as one system. Under the terms of the bill it is announced many improvements in the transportation system of the Public Service are planned. One of the immediate changes is in West Hudson and Bergen County, where the Hackensack-Newark railway line, is to be turned into a bus line from Hackensack to Rutherford, while from Rutherford the present railway line is to be continued. There is already a de luxe bus line from Hackensack to Newark.

Consolidation Rumors in Albany

An unconfirmed rumor is afloat in Albany, N. Y., that plans are being negotiated for a consolidation of all existing bus lines radiating out of Albany. It is said that a bus corporation operating in the northern and central portion of the state and a railroad controlled corporation are both seeking to promote such a consolidation.

Financial and Corporate

Canadian Park Property Passes to Electric Railway

The Canadian National Electric Railways has taken over the ownership of Eldorado Park served by the Toronto-Guelph line of the railway. Its former owners were a group of business men in Brampton and vicinity. The amount involved in the transfer has not been made known. It is stated that the park will be placed under the same management as the railway company's Lakeside Park at Port Dalhousie.

Eldorado Park has an area of 128 acres, and is looked upon as the choicest picnic property in the vicinity of Toronto. It is located upon the upper reaches of the Credit River, where nature has been generous in making that part of the country a delightful beauty spot. The most direct route to the park is over the railway's own line, but it is only a short distance from the Provincial highway running through Brampton.

The railway has under way a program of improvements to the park facilities, in order to bring it up to the same standard as the park at Port Dalhousie.

Mayor of Philadelphia Would Act to Condemn "Underliers"

Mayor Mackey of Philadelphia intends to start action on the McChord plan to untangle the city's transit problems by condemning Philadelphia Rapid Transit Company "underliers." Only a short time ago General Atterbury in a letter to the Mayor explained that elimination of the subsidiary companies would remove obstacles now in the way of developing the Pennsylvania Railroad terminal west of the Schuylkill.

Mr. Mackey says that he may ask the Public Service Commission to determine the value of the "underliers" in time to submit the question of their purchase to the voters in November. The McChord plan, he explains, calls for increasing the city's indebtedness to \$136,000,000, but not for any increased charge against the city borrowing capacity.

St. Joseph and Benton Harbor in Sale Proposal

A proposal is under consideration by local business men to purchase and expand the railway in the twin cities of Benton Harbor and St. Joseph, Mich., now run by the Benton Harbor-St. Joseph Railway & Light Company. A committee of six has been named by the Benton Harbor Chamber of Commerce to analyze the proposal and report its recommendations.

The question came up recently when it was revealed that the American Gas & Electric Company, which owns the outstanding capital stock of the local

company, contemplated the sale of the system. The American Gas & Electric Company is interested principally in gas and electric properties.

Receivership Case in Binghamton Still in Courts

Federal Judge Frank Cooper has received briefs in Albany on the motion entered by attorneys for the Chatham-Phenix National Bank & Trust Company, New York, in which permission was requested to foreclose and sell un-

der a mortgage held against the Binghamton Railway, Binghamton, N. Y.

The Chatham-Phenix is trustee under the first mortgage of \$500,000 by the railway. That company asks for extension of the present federal receivership of William H. Riley. It wants the proceeds of the receivership to be allocated so that \$100,000 in interest overdue and accruing on the mortgage may be paid.

A brief has been filed in opposition on behalf of the Traders Trust Company, Binghamton, trustee under the general consolidated mortgage of 1901, under which the receivership now stands.

Another hearing is scheduled to be held on April 5 before Special Master Roy C. McHenry, who will report to Judge Cooper.

Cincinnati Street Railway Doing Well

More passengers being carried. Surplus of \$172,765 from railway operation, but loss on coaches. Interesting comment by President Draper

OPERATION of the Cincinnati Street Railway, Cincinnati, Ohio, for the year resulted in an increase in the number of passengers carried and a slight increase in the actual surplus over all expenses, taxes and charges. The surplus would have been greater had it not been that a larger amount than had been anticipated or required to be accrued into the special depreciation reserve fund, was expended to take care of track reconstruction. Part of this was charged as an operating expense. Walter A. Draper, president of the company, said:

The test of the successful operation of the Cincinnati street railway under the service-at-cost plan is the amount of money that is paid into or withdrawn from the fare control fund. In the last two months of 1925, following the date when the new franchise went into effect there was paid into the fare control fund in the way of surplus earnings \$6,775. In the year 1926 the amount was \$14,064, while in the year 1927 the amount was \$20,339. The initial amount paid into the fare control fund when the new operations started was \$400,000, provided from the sale of securities, which has been increased to \$441,177 by the amount added in the 26 months of operation.

These small additions in themselves indicate, under the service-at-cost plan, that the rate of fare is almost exactly the right figure to provide for all of the requirements for the proper operation of the property. A total deficiency in an equal sum for the period mentioned would indicate the same thing. The fare control fund is provided as a reservoir into which small surpluses and out of which small deficits shall be paid so as to avoid too frequent changes in the rate of fare. It will be recalled that if the surplus should increase the fare control fund to \$600,000 fares would be reduced, and, likewise, if deficits should be paid out of the fare control fund so as to reduce it to \$200,000 fares would have to be raised. The rate of return to stockholders is fixed under this plan. Instead of the piling up of a large surplus as a

proof of sound financial condition, the fare control fund and possible increases or decreases in the rate of fare provide the stability and protection that a corporation must have in order to have good credit and realize successful operation.

TWO FULL YEARS UNDER NEW OPERATION

The Cincinnati Street Railway has completed two full years of operation under the new plan and at the rate of fare that went into effect on Nov. 1, 1925, of 8½ cents for tickets and 10 cents cash. It is possible therefore to present a statement showing the results of operation for the two years that are fairly comparable, being on the basis of the same corporate and financial structure and the same conditions of operation with two exceptions; first, the property of The Cincinnati & Hamilton Traction Company was operated under lease as part of the system to April 1, 1926, at which date it was purchased and made an integral part of the property; and second, the company began the operation of motor coaches in April, 1926, having no operations of that character prior to that date.

The results of operation of Cincinnati Street Railway including cars and coaches follow:

	1927	1926
Operating revenue.....	\$8,700,257	\$8,065,296
Operating expenses.....	6,332,429	5,846,221
Net operating revenue....	\$2,367,827	\$2,219,074
Taxes.....	771,369	708,831
Operating income.....	\$1,596,458	\$1,510,242
Non-operating income.....	48,021	37,220
Gross income.....	\$1,644,480	\$1,547,463
Rental, interest, sinking fund and return on capital	1,624,140	1,533,399
Balance.....	\$20,339	\$14,064
Fare control fund previous balance, including initial \$400,000.....	420,837	406,733
Total in fare control fund.	\$441,177	\$420,797

A separation of this statement between cars and motor coaches would

STATEMENT OF PASSENGERS CARRIED BY CINCINNATI STREET RAILWAY

	1927	1926	1925	1924	1923	1922	1921
Revenue Passengers:							
Cars.....	94,006,310	89,493,159	90,629,875	100,839,343	108,625,599	107,528,666	106,527,759
Coaches.....	6,816,139	4,104,586					
Total revenue passengers.....	100,822,449	93,597,745	90,629,875	100,839,343	108,625,599	107,528,666	106,527,759
Transfer Passengers:							
Cars.....	30,221,784	29,480,811	30,832,130	32,706,502	34,066,858	34,765,044	34,904,917
Coaches.....	1,390,784	768,711					
Free Passengers:							
Cars.....	1,553,513	1,465,801	1,309,845	1,319,318	1,292,290	1,399,018	1,527,297
Total, all passengers.....	133,988,530	125,313,068	122,771,850	134,865,163	143,984,747	143,692,728	142,959,973

show that the operation of the former resulted in a considerable surplus while in the case of coaches a loss was sustained. The surplus from car operation was \$172,765, and the loss from coaches was \$152,426, the combined statement therefore showing a surplus of \$20,339. Mr. Draper explains that as long as coaches are used to serve remote and thinly populated parts of the city they may be expected to show a loss, but it is encouraging that this loss has been reduced in the latter part of the year and promises further improvement.

One of the provisions of the franchise under which the company operates is that on Dec. 1 of each year there must be filed with the city an estimate of gross receipts and budget of operating expenses, taxes, fixed charges and return on capital for the ensuing calendar year. The estimate for the year 1927, which was filed on Dec. 1, 1926, was closely realized by the actual results, as the actual operating revenue for the 12 months was \$8,700,257 or \$37,000 over the estimate, while the surplus after paying all requirements for the year was \$20,339 or \$8,712 in excess of the estimate.

Included in revenue passengers carried are those riding on the Sunday pass, which has now been in use for more than a year. The number of Sunday passes sold during the year was 556,736, which were used for a total of 3,450,344 rides. The Sunday pass is sold for 25 cents and is good for as many rides as the times it is presented by the holder on cars of the system between the hours of 5 a.m. and midnight on the same day sold. No transfers are issued on the Sunday pass, hence each time it is presented for fare it is recorded as a ride.

\$1,209,453 SPENT ON TRACK

In no department was there greater activity in 1927 than in the roadway department. The program of track reconstruction, as distinguished from ordinary maintenance and repairs, included 33 major locations and involved an expenditure of \$1,209,453, of which \$936,753, was chargeable to operating expense as renewals and replacements and \$272,700 to additions and betterments as adding to the value of the property through the installation of heavier foundation and rails and steel ties in place of the previously constructed lighter track. This was almost twice the amount expended the previous year and much in excess of the amount anticipated to be done in any one year when operations were undertaken under the new franchise. This measure re-

quired the company to charge to a special depreciation reserve fund over a period of 50 months a total sum of \$1,750,000 for track reconstruction. It was early seen, however, that it would be to the advantage of the city as well as the patrons of the system if the work were speeded up sufficiently to correspond more nearly with the program for street improvements by the city.

EXPENDITURES ON OBSOLETE EQUIPMENT UNWISE

On the subject of cars Mr. Draper said:

It has been the policy of the company to put the track in good operating condition before proceeding with the purchase and operation of new cars. The point has now been reached where new cars can fit into the rehabilitation program and the company will shortly be prepared to place a contract for the construction of from 50 to 100 new cars, delivery of which is expected to be made during the summer. The present equipment operated by the company has been improved in many ways, but the expenditure of additional money on obsolete equipment should be abandoned in favor of the purchase of entirely new rolling stock.

EMPLOYEES PLAY THEIR PART WELL

More and more it is being realized by all of the employees of the company that we are all part of one big family and that our interests are mutual and our welfare interdependent. Probably nothing has served to emphasize this more than the starting of a company publication called the *Cincinnati Street Railway News* devoted to the interest and the welfare of this big group of railway people.

The courtesy shown by the company employees toward the car-riding public is increasingly commented upon and many responsive echoes from individuals are received in the shape of commendatory letters. Complaints there are, naturally, where 1,500 men come in daily contact with 400,000 people, but in every such case an effort is made either to make amends, to correct or to explain, and above all, to show the complainant that the company is desirous of learning of every incident that should have attention.

The statement of additions and betterments made to the Cincinnati property during 1927 follows:

Way and structures.....	\$272,700
Real estate for loops.....	40,442
Winton shops, real estate and buildings...	792,084
Sub-station real estate and buildings.....	141,955
Automotive equipment.....	35,758
Shop equipment (tools).....	8,434
Remodeling cars into prepayment type...	15,158
Miscellaneous.....	36,083
Total cars.....	\$1,342,617
Motor coaches.....	\$78,185
Coach, shop and service equipment.....	12,266
Total coaches.....	90,452
	\$1,433,070

The building up of the capitalization

of the company or capital value from the date when the present plan of operation went into effect is shown by the following table:

Capital Stock	
Outstanding Nov. 1, 1925....	\$22,761,950
Issued to buy Cincinnati and Hamilton property.....	1,000,000
Total.....	\$23,761,950
5 1/2 per cent gold bonds.....	7,000,000
Car trust notes.....	512,500
Additions and betterments to Dec. 31, 1927.....	\$2,403,369
Funded.....	2,181,950
Unfunded additions and betterments provided by company funds.....	221,419
Total capital value Dec. 31, 1927....	\$31,495,869

On the subject of the bus Mr. Draper said in part:

The officers of your company are of the opinion that the motor coach is a type of transportation which fits in logically with rail operation. It is good sense for railway systems to utilize the motor coach where it can best serve different communities, and also to use it in experimentation to determine how it may best fit in. As yet it would appear that mass transportation, particularly in large cities, can best be handled by the familiar form of street cars improved and developed to meet the special needs. The field of the motor coach has heretofore been limited by the size of the units available. There has now been developed a new motor-coach unit of greater carrying capacity which must be reckoned with and which may cause street railway operators to change their opinion as to the availability of the motor coach for use in city transportation. It is wise, therefore, to consider all the possibilities of the motor coach in connection with any future extension that the company may be called upon to make by the growing community.

On the matter of the rapid transit line and other subjects the report says, in part:

The report of the Beeler organization, employed jointly by the city and the company to make a survey of the rapid transit line situation, has been completed. An analysis and study of the Beeler report is now being made in order that the company may be in a position to undertake intelligently the discussion of what had best be done with this important enterprise. The position of the company is that if the Rapid Transit Line can be operated as a part of the local transportation system with the reasonable certainty that the operating costs and taxes, together with all of the fixed charges and return on capital of the present system can be met, it is willing to undertake its operation on a basis that will insure this result as far as possible. A committee has been authorized by Council to sit with the Rapid Transit Commission in the discussion with the company of this important matter. Mutual interest of city and company in retaining the integrity and increasing the efficiency of the existing transportation system (which will have to continue to serve by far the greater majority of the people) should leave little room

for disagreement as to the principal terms and conditions of operation.

It has been the endeavor of the officials of the company to co-operate with the city administration in every way and, in return, fair treatment and unprejudiced consideration has been accorded by the Mayor and other members of Council, the City Manager, the Director of Public Utilities and all city officials with whom the company is brought in contact.

When the franchise under which the company is operating went into effect on Nov. 1, 1925, the annual return to stockholders was reduced from the former rate of 6 per cent to 5 per cent for a period of three years. The allowance to the company for dividend payments to its stockholders will consequently continue at the rate of 5 per cent until Nov. 1, 1928, when the amount of the allowance will return to that which will allow the payment of 6 per cent. Some stockholders have felt that this temporary reduction in the return on capital has been a hardship that they should not have been called upon to suffer. However, the purpose was to help to provide funds for putting the property in a better condition than that in which it was found as the result of the four years of negotiation. It is a wise thing for directors properly to maintain the property in their charge. While a larger return on capital than 6 per cent has been allowed to public utilities in many rate cases before courts and commission, it must be kept in mind by stockholders that to offset this limited return and the control exercised by the city there is provided in our case a fair and equitable means for insuring this return, which is as far as the municipality could go toward making the return safe and secure.

In a year of rehabilitation, development, experimentation and adaptation to new conditions, the officials of the company have worked steadily and enthusiastically to accomplish the task that was so clearly set before them. Likewise, the directors of the company have been patient and interested in hearing the many problems presented to them and thoughtful and considerate in advice as to how they should be solved. To directors and officials and also to the rank and file of employees my thanks and appreciation are cordially extended.

Although this may not be a proper place in which to do so, I desire to express appreciation to the newspaper men of Cincinnati who have been so thoroughly interested in our endeavors to improve the transportation system, and also express a full measure of gratitude to all citizens generally who have helped in greater or less degree by their praise and advice and criticism, and even their complaints, and most of all to the hundreds of thousands who have shown an increasing confidence in the ability of the company to serve them by their increased patronage of cars and motor coaches.

New Chairman in Baltimore

At a meeting of the stockholders of the Washington, Baltimore & Annapolis Electric Railroad, held in Baltimore on March 26, Herbert A. Wagner was elected chairman of the board. He succeeds George T. Bishop, Cleveland, who resigned from the board some time ago. Mr. Wagner is president of the Consolidated Gas, Electric Light & Power Company, Baltimore, which controls the electric railroad and its subsidiaries through a holding company.

Economy and Efficiency Help Boston Elevated

Operation of the Boston Elevated Railway, Boston, Mass., during the last eight years has been set forth for study in parallel columns giving a few vital operating statistics for the two years 1920 and 1927.

Thirty-one million more people used the "El" in 1927 than in 1920, and the average fare per revenue passenger decreased from 9.868 to 9.266 cents. It is also disclosed that 5,500,000 more miles and 1,500,000 more round trips

payment of dividends until the earnings of the company prove sufficient to warrant a resumption of payment.

You are of course aware that the application of that company for increased fares is now before the Board of Railway Commissioners for Canada, and your directors have every confidence in the merits of the application.

Your directors feel very strongly that there is nothing in the present situation to occasion any feeling of alarm in the minds of the shareholders. They themselves and other large shareholders who have made a study of the situation feel quite satisfied that the position of the company is inherently sound and that the present difficulty

AN EIGHT-YEAR COMPARISON OF BOSTON ELEVATED RAILWAY

	1920	1927	Increase	Decrease
Revenue passengers, 5-cent fare.....	8,952,577	8,534,666		417,911
Revenue passengers, 6-cent and 6½-cent fare.....		58,890,542	58,890,542	
Revenue passengers, 10-cent fare.....	326,496,184	299,340,854		27,155,330
Special car and bus passengers.....	77,800	172,846	95,046	
Total.....	335,526,561	366,938,908	31,412,347	
Average fare per revenue passenger, cents.....	9.868	9.266		0.602
Wages—Amalgamated and Craft employees.....	\$14,040,747	\$18,045,550	\$4,004,803	
Actual total wage cost.....	\$17,216,445	\$16,757,338		\$459,107
Average employees on payroll.....	9,628	8,607		1,021
Gross revenue.....	\$34,031,636	\$35,193,410	\$1,161,774	
Fixed charges (taxes, rent of leased roads, dividends, subway and tunnel rents, interest on bonds and notes) and miscellaneous items.....	\$8,609,681	\$9,838,261	\$1,228,580	
Operating expenses.....	\$25,769,122	\$25,132,333		\$636,789
Ratio of operating expenses to gross revenue, in per cent.....	75.721	71.412		4.309
Revenue-mileage.....	51,237,527	56,827,962	5,590,435	
Round trips operated.....	5,764,347	7,295,371	1,531,024	
Car defects per 10,000 car-miles.....	13.4	3.8		9.6
Revenue passengers per mile.....	6.548	6.457		0.091
20-minute delays in service.....	885	500		385

*Based on hours and rates of 1920.
If operating expenses in 1927 had taken the same percentage of gross revenue as in 1920, they would have been greater by \$1,516,484, and there would have been a deficit for the year of \$1,293,668.

were operated in 1927, and as a result the number of revenue passengers carried per mile decreased from 6.548 to 6.457.

Without the economies which have been effected, the wage increases awarded during the eight-year period would have placed a burden of \$4,000,000 on the car riders. Fixed charges (taxes, rent of leased roads, dividends, subway and tunnel rents, interest on bonds and notes) have increased by \$1,250,000 in this period.

Notwithstanding the wage and fixed charge burdens, the actual payroll was \$459,107 less in 1927 than in 1920 and operating expenses as a whole were \$636,789 less than in 1920.

If operating expenses in 1927 had taken the same percentage of passenger revenue as in 1920 there would have been a deficit in 1927 of \$1,293,668 instead of a surplus of \$222,000.

Nothing in Ottawa Situation to Cause Alarm

Shareholders of Ottawa Traction Company, Ottawa, Ontario, are in receipt of a circular letter, signed by President Thomas Ahearn, setting forth the reasons for the cancellation of the quarterly dividend of 1 per cent, payable ordinarily on April 2 next. The letter reads as follows:

Your directors regret very much the necessity of informing you that the reserve fund of the Ottawa Electric Railway, which has been used for the purpose of dividends for the past four years, is exhausted and that it is, therefore, necessary to suspend

is that the company has for some years been selling transportation at a price too low. Ottawa will always need the street cars, and the Ottawa Electric Railway will always be able to provide transportation at a rate which will justify people in using its system.

Local Ownership the Aim in Worcester

For the first time since the New York, New Haven & Hartford Railroad resumed control of the Worcester Consolidated Street Railway, Worcester, Mass., it has been revealed that the ultimate aim of the railroad officials is to have the road become the property of Worcester investors, once it has been thoroughly rehabilitated and put on a sound basis.

Edward G. Buckland, vice-president and general counsel, says it is now the hope of the New Haven to return to the city the management of its trolleys in order that the railroad can concentrate its attention on the steam road properties. Mr. Buckland is confident the Worcester line can be made to pay. He explains that the New Haven road is getting things into shape in the hope that in the not too distant future it can entertain offers for the property.

Since reassuming control of the Worcester line in 1926 the New Haven has spent more than \$1,000,000 in a rehabilitation program. This covers only part of the work to be done. Mr. Buckland says the New Haven has no prospective customer in view for the purchase of the Worcester road. When the road is placed on a paying basis it

will be ready to entertain propositions and Mr. Buckland believes that if it is earning 6 per cent on the investment there will be no dearth of purchasers. He is quoted as follows:

We would prefer to sell to Worcester interests. It is our belief that an electric railway should be locally owned just as much as an electric light company or a gas company. However, we are not idealists. If an attractive offer was received from a large utility operating company we would consider it carefully.

Preferred Dividend Passed by Tri-City Company

The Tri-City Railway & Light Company, Davenport, Ia., has passed the preferred dividend due on April 1, this year. The last payment was 1½ per cent, made on Jan. 2.

Richard Schaddelee, president of the United Light & Power Company, and a director of the Tri-City Company, said recently:

Under present conditions the operation of the railway systems in the tri-cities is producing barely enough to pay the straight operations costs, plus the taxes, without earning a cent for depreciation.

The situation is growing steadily worse and we have racked our heads for a solution, without being able to find one.

First Dividend on St. Louis Public Service Preferred

The first quarterly dividend of the St. Louis Public Service Company, St. Louis, Mo., has been declared on the preferred stock of the company. It is payable on April 1 to stockholders of record of March 20. The company has outstanding a total of 70,620 shares of preferred stock, of which 16,212 shares were allotted to the city, 53,845 shares to former St. Louis Transit Company bondholders and 553 shares to various other creditors of the United Railways, which the St. Louis Public Service succeeded after foreclosure and sale.

Financial Condition of Southern Michigan Divulged

The Southern Michigan Railway, operating from South Bend, Ind., to Benton Harbor, Mich., which went into receivership in Grand Rapids on Feb. 10, owes corporation income taxes and interest totaling \$25,411 in Indiana, according to a statement received from George L. Foote, Indiana collector of internal revenue. The company owns tracks from the northern city limits of South Bend to the state line and the worth of the property is estimated at \$2,000,000. The Chicago, South Bend & Northern Indiana Railway, which owns the Southern Michigan stock, operates railway service to St. Mary's over the Southern Michigan line. It is serving as receiver pending the outcome of proceedings in the Michigan Federal Court. The Northern Indiana line itself is under R. R. Smith, general manager, as receiver.

Personal Items

Changes in Buffalo

T. E. Mitten resigns from International Board. Messrs Lesswing, Sherman and Koch represent employees

AT THE annual stockholders' meeting of the International Railway, Buffalo, N. Y., held March 27, T. E. Mitten resigned from the board, on which he has served since 1920. This enables the employees to have three representatives instead of two. The following directors were selected to serve for a period of one year: A. A. Mitten, chairman; J. A. Queeney, vice-chairman; C. J. Joyce, W. K. Myers, Nelson Robinson, B. J. Yungbluth, H. P. Lesswing, M. H. Sherman and R. W. Koch.

The employee representatives on the board are: H. P. Lesswing and M. H. Sherman, president and vice-president of the employees Co-operative Association; and R. W. Koch, chairman of the general committee of employees under the Mitten plan. The board of directors thus consists of nine men, three of whom directly represent the employees, who are substantial owners of International Railway system. W. K. Myers, who is financial vice-president of Mitten Management, Inc., succeeds H. G. Tulley, former president of the International Railway and now vice-president of Mitten Management in charge of industrial relations.

MR. MITTEN TO GIVE MORE TIME TO BANKING

The meeting of the new board of directors was held immediately following the annual stockholders' meeting. A. A. Mitten was elected to succeed his father as chairman of the board, and J. A. Queeney, vice-chairman. Mr. Queeney continues as chairman of the executive committee whose membership also includes A. A. Mitten, W. K. Myers and B. J. Yungbluth. The board of directors elected the following officers of I.R.C.: B. J. Yungbluth, president and general manager; N. T. Brown, vice-president of transportation; C. A. Weber, secretary and treasurer; and C. A. Chavel, auditor.

The resignation of Mr. Mitten from the board of the International Railway follows closely his resignation from the board of the Philadelphia Rapid Transit Company, and is in line with his announced intention to relinquish active operation of the Mitten properties to the younger men whom he has trained to succeed him. In this way he can devote his entire time to Mitten Bank and the Mitten Bank Securities Corporation, through which he plans to advance still more widely the principle of democracy in industry.

Dr. A. A. Mitten is the only son of T. E. Mitten. He is well known in Buffalo, having lived for some time in Lockport and having graduated from the University of Buffalo. He has

served for several years as vice-president of Mitten Management, Inc., which operates International Railway property, the Philadelphia Rapid Transit Company, the Yellow Cab Company of Philadelphia, the Yellow Cab Company of Atlantic City and associated enterprises. He is vice-president of Mitten Men and Management Bank and Trust Company and also a vice-president of the new Mitten Bank Securities Corporation. Dr. Mitten was educated as a physician and surgeon. His first connection with the electric railway industry was in 1915 when he became industrial surgeon in Milwaukee. When the United States entered the World War Dr. Mitten went to France as a captain of an ambulance company. When he returned to this country he became very much interested in the far-reaching demonstration of industrial democracy which his father was developing in Philadelphia.

Dr. Mitten's personality makes him eminently well qualified to establish and maintain the intimate contacts between men and management which are so essential to the Mitten plan for industrial democracy. He is as much at ease with a track employee as he is with one of the officials of the company and the interesting thing about it is that the track employee will be equally at ease with Dr. Mitten.

Mr. Lesswing has been continually in the employ of the International Railway since May 7, 1917. He is 28 years old and is employed as an electrician in the power department.

Mr. Sherman has spent 6 years in the service of the International Railway and is an operator working out of Broadway station.

Mr. Koch was employed on April 15, 1909 and is a substation operator in the electrical department. He is 37 years old.

Charles Fields and Otto Schultz Newly Assigned in New Jersey

Charles Fields has been appointed manager of the new Morris division of the Public Service Railway, Newark, N. J., and Otto G. Schultz has been assigned, reporting to Matthew R. Boylan vice-president in charge of operation, co-ordinated transport.

Mr. Fields started his career in the transportation business as conductor with the Brooklyn Rapid Transit Company in 1905. In 1907 he accepted a position as inspector with the New York & Queens County Railway, being subsequently promoted to chief inspector. In 1913 he became superintendent of the Binghamton Railway Company, Binghamton, N. Y. He left the employ of this company in 1917, to engage in special transportation work for Stone & Webster, and the J. G. White Management Company. In 1923 Mr. Fields was transferred to the

Morris County Traction Company as general superintendent.

Mr. Schultz has been associated with the Morris County Traction Company since December, 1909, and has held the position of manager and treasurer during that time.

Messrs. Gunn and Francis Advanced in San Francisco

Two more employees of the Market Street Railway, San Francisco, Cal., who began their railroad experience on the platforms of the cars in that city, have stepped into executive positions. They are Byron F. Gunn, who has become superintendent of the Geneva division, and A. E. Francis, who succeeds him in the post of superintendent of ferry terminals.

Mr. Gunn entered the service of the company Jan. 27, 1909, as a conductor at the Kentucky division. He was appointed starter at Third and Townsend Streets station Oct. 14, 1914. Here he distinguished himself for his handling of thousands of commuters and in dealing with emergency situations such as arise around terminals. From May 1, 1927, he has served as superintendent of ferry terminals.

Inspector A. E. Francis succeeds Mr. Gunn as superintendent of ferry terminals. Mr. Francis entered the service on Dec. 11, 1907. His appointment as inspector came on Nov. 22, 1910. He served as relief inspector, thus familiarizing himself with the entire system in San Francisco and meeting thousands of people.

H. J. MARTIN has been promoted to the position of safety inspector of the New York State Railways, covering all Rochester, N. Y., city lines, including the co-ordinated buses. Mr. Martin began his railway career twenty years ago in Manchester, England, where he operated both as a motorman and conductor. He served in Hamilton, Ont., going to Rochester as a conductor in 1921. Later he was made inspector on the Rochester lines. In addition to his other duties Inspector Martin teaches in the school of instruction, aids in the investigation of accidents and makes special investigations of safety suggestions.

W. F. BURDELL was elected assistant secretary and assistant treasurer at a recent meeting of the stockholders of the Scioto Valley Railway & Power Company, Columbus, Ohio.

F. S. SHEFFIELD, formerly chief instructor for the Eastern Texas Electric Company, Beaumont, Tex., has been appointed assistant superintendent of transportation. He will report to O. W. Gaines, who, in addition to his work of superintendent of transportation in Beaumont, has similar duties in Port Arthur. The property in the latter city was recently purchased by the Eastern Texas Electric Company as told in *ELECTRIC RAILWAY JOURNAL*.

FRANK MILHOLLAND, chairman of the North Dakota Railroad Commission, will resign from that position April 1 to become president and general manager of the Central West Public Service Company with headquarters in Omaha, Neb. The Central West Public Service Company properties serve 29 cities and towns in Iowa, Nebraska, Minnesota, South Dakota and North Dakota with electricity, telephones, gas and water.

Obituary

Edwin E. Downs

Edwin E. Downs, superintendent of railway revenues of the Winnipeg Electric Company, Winnipeg, Canada, died in Winnipeg on March 17. Mr. Downs was well known throughout the electric railway industry, which he had served for about 35 years.

His first business experience was in general contracting and telephone work. With the introduction of electricity for use on city and other railways he became connected with the construction department of the Thomson-Houston Company and had charge of installing electricity on the Second Avenue Passengers' Railway, Pittsburgh, Pa., the first railway in Pittsburgh to adopt electricity. Later he installed electricity on the Missouri Street Railway, St. Louis, Mo.; City Electric Railway, Little Rock, Ark.; Fort Clark Street Railway, Peoria, Ill., and the Fort Wayne & Belle Isle Railway, Detroit, Mich. In his work at Little Rock Mr. Downs was associated with Bion J. Arnold.

Subsequently Mr. Downs became manager of the railways in Kalamazoo and Battle Creek, Mich., for the General Electric Company.

Mr. Downs assisted in constructing an electric railway between Anderson and Marion, Ind., and in 1907 was engaged by George J. Kobush, St. Louis, Mo., as general manager of the Winnebago Traction Company, Oshkosh, Wis., with which company he remained for more than seven years. In October, 1904, Mr. Downs went to San Francisco in the interests of E. H. Rollins & Sons, Boston, Mass., as general manager of the Petaluma & Santa Rosa Railway. In March, 1908, he succeeded E. R. Kirk as general manager of the Sterling, Dixon & Eastern Electric Railway. Two years later he was appointed general manager of the Chicago & Milwaukee Electric Railway and later moved to Winnipeg to take the position with his old working comrade, President A. W. McLimont, as superintendent of railway revenues.

WILLIAM F. M. GOSS, formerly dean of the College of Engineering at the University of Illinois and president of the Railway Car Manufacturers' Association for ten years, died on March 23 at the Waldorf-Astoria Hotel, New York. Dr. Goss is probably best known

to the electrical industry for his work as a member and later as chief engineer of the Chicago Association of Commerce committee on smoke nuisance and the electrification of railroad terminals in Chicago. In the course of his academic career he organized the department of practical mechanics at Purdue University, with which institution he was connected for seventeen years, being dean of the engineering school for a large portion of that time. In 1907 he became dean of the College of Engineering of the University of Illinois, but ten years later he severed his connection with that faculty to take up the duties of president of the Railway Car Manufacturers' Association. Dr. Goss was active in association work, having been a past-president of the American Society of Mechanical Engineers, a fellow of the American Association for the Advancement of Science, a member of the Society for the Promotion of Engineering Education and of other engineering associations. Dr. Goss was a native of Massachusetts and a graduate of the Massachusetts Institute of Technology. He was 69 years old.

T. R. BRISTOL, assistant superintendent of equipment, Georgia Power Company, Atlanta, Ga., died March 9. Mr. Bristol served his apprenticeship as a young man with the Santa Fe System. Then he served the Westinghouse Traction Brake Company for a number of years. He saw service in France with the railway engineers and after the war he resumed his duties with the Westinghouse Traction Brake Company, being stationed in Atlanta as mechanical expert. Mr. Bristol became affiliated with the Georgia Power Company in September, 1921. He was well known throughout the Southeast, which was the territory he traveled for the Westinghouse Traction Brake Company and also through his activities in the Electric Railway Association of Equipment Men, Southern Properties. Mr. Bristol was in his 32nd year.

PETER J. METZDORF, assistant to the vice-president of the Twin City Rapid Transit Company, Minneapolis, Minn., died recently. After a term of service as supplies salesman, manager of outdoor amusement enterprises and pavilions in St. Paul and county treasurer, 21 years ago he first became a member of the staff of the Twin City Rapid Transit Company, as chief clerk. Later he looked after other enterprises of the Twin City Rapid Transit Company and managed other electric railway recreational projects.

PHILIP MATTER, a director of the Indiana Union Traction Company, Anderson, Ind., and one of the principal stockholders of the company, died recently at his home in Marion, Ind., following a few days' illness resulting from a fall. He settled in Indiana in Civil War days. His judgment was sought in many business transactions and his advice aided many Marion men to build and increase their fortunes. He is survived by three sons and three daughters. Mr. Matter was 85 years old.

Manufactures and the Markets

General Electric Annual Report

The net profit of the General Electric Company for 1927 amounted to \$48,799,489, after interest, depreciation and taxes. This was equal after dividends on the special stock to \$6.41 a share earned on 7,211,481 no par common shares. It compared with \$46,672,499, or \$6.14 a share, earned in 1926.

Orders received during the year amounted to \$309,784,623, against \$327,400,207 in 1926, a decrease of 5 per cent. Unfilled orders at the close of 1927 were \$68,916,000, against \$72,297,000 at the close of 1926, also a decrease of 5 per cent. Net sales billed during the year were \$312,603,772, against \$326,974,104 in 1926.

Inventories, after reserves, were \$67,213,705 at the end of 1927, against \$65,295,154 the year before. At the close of 1920 inventories amounted to \$118,109,173 and shipments were \$275,758,487, the ratio of inventories to shipments being 42.8 per cent. At the close of 1927 the ratio was 21.5 per cent, or a turnover nearly double that of 1920. An increase of 13 per cent in shipments billed was accomplished, while the capital locked up in inventories was reduced to \$50,895,000.

Uruguay Asks Bids For Oil-Electric Units

Bids are now being sought by the Administración de los Ferrocarriles y Tranvías del Estado covering construction of two gas-electric generating units to be installed in two of the Unicars which were bought some time ago by the Uruguayan Government. Copies of the call for bids will be lent to interested firms upon request to the Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to No. EE 1069. The closing date for bids is 11 a.m., June 1, 1928.

Business of Austin Company Very Active

Unusual building activity in the Cleveland territory is reported by the Austin Company, well known national builders, with headquarters in Cleveland. More than a dozen of the 100 building projects which this firm has under way from coast to coast are located in Greater Cleveland alone; among them is a large garage and service station, for the Cleveland Railway, costing about \$200,000, with three stories and basement 100x125 ft. in size.

Austin's 1928 business is starting with a volume that bids fair to make the year even better than 1927, which was the most successful in the company's history.

The Austin Company is expanding its own facilities to meet this greatly increased demand. At its main office, corner Euclid and Noble Road, ground has been broken for a large two-story and basement addition to the office building. Greater facilities for the engineering department and general office use are being provided at a cost of more than \$50,000.

At Bliss Mill, Austin's steel fabricating plant, in Euclid, Ohio, provision is being made now for the construction of an entire new woodworking shop to replace the cramped quarters at its

present location on East 152nd Street, opposite the Jordan Motor Company plant. This move will result in the mobilization of all Austin service facilities at Bliss Mill, where the steel fabricating plant has been located for several years. Austin is the largest fabricator of structural building steel in the Cleveland territory.

Spanish Railway Improvements

Plans for the expenditure of 1,433,670,000 pesetas for improvements in the rail systems of Spain were approved at a recent meeting of the Supreme Railway Council. Of this amount 160,980,000 pesetas has been allotted for improvement of the electric service. A peseta is approximately 17.1 cents.

New Twin City Cars in Operation

The Twin City Rapid Transit Company, Minneapolis, Minn., has put in operation 25 new street cars. The cars are of the light-weight, noiseless type built in the Snelling shops of the company.

The car body is built on a steel and duralumin frame weighing 4,230 lb. In addition to this metal frame, the car has a complete frame of white oak. The ceiling, roof and sides of the car are plywood and the vestibule linings are plymetl. The floor is double and well insulated and the inside finish is mahogany with a white ceiling.

The trucks are each equipped with 56 coil and elliptic springs and a swinging spring plank giving a perfect graduation of the load and eliminating vibration.

With this car having a normal load,

it is possible to reach a speed of 21 m.p.h. and to come to a stop within 600 ft. in 26 seconds.



The interiors of these cars are in mahogany finish with a white ceiling. They are well lighted and ventilated



One of the light-weight, noiseless type cars put in operation by the Twin City Rapid Transit Company

Name of railway	Twin City Rapid Transit Company
City and state	Minneapolis, Minn.
Number of units	25
Type of unit	one-man, two-man, double-end
Number of seats	50
Weights:	
Car body and equipment	17,983 lb.
Trucks	6,980 lb.
Total	24,963 lb.
Length over all	45 ft. 6 in.
Truck wheelbase	4 ft. 6 in.
Width over all	9 ft. 0 in.
Body	Semi steel
Doors	End
Air brakes	G. E. Concentric Clasp
Armature bearings	Roller

Axles	Tubular
Compressors	G. E.
Control	G. E.
Door mechanism	National Pneumatic
Doors	Folding
Fare boxes	Johnson
Hand brakes	Peacock
Headlights	Ohio Brass
Interior trim	Wood-trim mahogany with aluminum metal trim
Journal bearings	Hyatt roller
Motors	G. E. No. 4
Roof material	Plywood
Seats	Rattan
Wheels, type	Steel, oil tempered, diameter 26 in.

Philadelphia Station Control Contracts to Be Let

The contract for station control and miscellaneous equipment is one of the most important awards on the Broad Street Subway yet to be let by the Department of City Transit, Philadelphia, Pa. It provides for furnishing and installing in the fourteen subway stations fencing, railings, gates, grills, handrails, baggage boards, signs, ticket booths, passimeters and turnstiles. Railings are to be constructed around the upper track levels, guard plates for emergency exit doors are to be placed in the sidewalk ventilator gratings, signs are to be placed along the tracks and in the emergency exits, and bent numbers are to be stenciled on the subway walls and columns. The specifications also provide that ticket booths shall be installed on mezzanine floors in express stations and on the platforms of local stations. There will be two types of ticket booths—the side control booth and the end control booth.

New Type Electric Locomotives for South Africa

Seventeen bids have been received in South Africa for an experimental type of electric locomotive for use on the Natal electrified system. This locomotive is to be three times as powerful as any of the units now employed on the South African Railway. Future orders for any number of locomotives up to 100 depend on the success of this experiment.

ROLLING STOCK

FITCHBURG & LEOMINSTER STREET RAILWAY, Fitchburg, Mass., has ordered five 21-passenger street car type Studebaker buses from the Studebaker Corporation of America, South Bend, Ind.

PUBLIC SERVICE CO-ORDINATED TRANSPORT, Newark, N. J., has received the first shipment of bus chassis on order of 331 gas-electric chassis recently placed with the Yellow Truck & Coach Manufacturing Company. Three chassis a day will be turned out up to April 15, and five a day thereafter, until the order is completed.

DETROIT MUNICIPAL RAILWAY, Detroit, Mich., will do nothing more about the purchase of additional buses, on which bids were recently received, until the results are made known of a survey of bus operation to be made by W. B. Mayor at the suggestion of the Street Railway Commission.

TRACK AND LINE

INTERNATIONAL RAILWAY, Buffalo, N. Y., is planning to co-operate with the city in repaving and rebuilding streets over which its local traction lines operate. One of the first major improvements planned by the railway is

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

Metals—New York		Feb. 27, 1928
Copper, electrolytic, cents per lb.	13.90	
Copper wire, cents per lb.	16.125	
Lead, cents per lb.	6.00	
Zinc, cents per lb.	6.0375	
Tin, Straits, cents per lb.	52.875	
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	4.125	
Somerset mine run, f.o.b. mine, net tons.	1.875	
Pittsburgh mine run, Pittsburgh, net tons.	2.025	
Franklin, Ill., screenings, Chicago, net tons.	1.825	
Central, Ill., screenings, Chicago, net tons.	1.675	
Kansas screenings, Kansas City, net tons.	2.375	
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	15.30	
Weatherproof wire base, N. Y., cents per lb.	16.5125	
Cement, Chicago net prices, without bags.	2.05	
Linseed oil (5-bbl. lots), N. Y., cents per lb.	10.2	
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.25	
Turpentine (bbl. lots), N. Y., per gal.	\$0.645	

the rebuilding of part of its William Street line to handle the heavy traffic which will result with the opening of the new passenger terminal of the New York Central Railway late this year. Several other lines will be included in the reconstruction and improvement program.

MONTREAL CITY COUNCIL, Montreal, Canada, has granted a contract to a local firm for the construction of the roadbed for the double tramways line across the top of Mount Royal. The project will involve an outlay of \$287,415.

SHOPS AND BUILDINGS

WINNIPEG ELECTRIC COMPANY, Winnipeg, Manitoba, Canada, will soon erect a new terminal power station in Winnipeg, to cost approximately \$750,000.

TRADE NOTES

L. W. BIRCH of the Ohio Brass Company, Mansfield, Ohio, has been made assistant manager of the railway sales division. He became a member of the staff of the Ohio Brass Company in December, 1921, and during recent years has specialized on the overhead distribution systems for electric railways. Mr. Birch was graduated from the Ohio State University in 1917 and after a brief service in the army, in which he became first lieutenant, joined the Carolina Power & Light Company and later the Pittsburgh Plate Glass Company.

WILLIAM H. WOODIN, chairman and president of American Locomotive and American Car & Foundry, has been elected a director of American Surety Company.

TRUSCON STEEL COMPANY, Youngstown, Ohio, has named C. I. Auten, vice-president in charge of sales in its standard building division. M. T. Clark is vice-president in charge of sales of the steel window division, with which he has been identified for the last nine years. C. D. Loveland, formerly manager of the Pittsburgh district of the Truscon organization, is made vice-

president with headquarters at Newark, N. J. He will be in charge of Truscon distribution in that state.

FORD CHAIN HOISTS are now being distributed on the Pacific Coast by E. O. Johnstone, district sales manager for the American Chain Company, Inc., at 425 Second Street, San Francisco, Cal.

FRED A. WALES has been appointed to do sales promotion work for the bus coach work division of the Murray Corporation, according to an announcement by William Robert Wilson, chairman and president of the corporation. Mr. Wales was former sales manager of the body division of the Aluminum Company of America. He goes to the Murray Corporation equipped with an experience of twelve years in the aluminum and aluminum alloy industry. As an officer in the production division, U. S. Army Engineers, he was closely connected with the development of the Class B military truck, known as the Liberty truck.

HEYWOOD-WAKEFIELD COMPANY has appointed C. E. Preble, who has had charge of the engineering department at Wakefield, Mass., assistant to Bertram Berry in the railway sales department, New York, N. Y.

NATIONAL FLUE CLEANER COMPANY, Groveville, N. J., has recently appointed the following representatives: Chicago territory, Naylor-Hickey Corporation, 643 Washington Boulevard, Chicago, Ill.; New England territory, Furnace Improvement Company, 511 Westminster Avenue, Providence, R. I.

OXWELD ACETYLENE COMPANY, New York, N. Y., will in the future distribute exclusively the Carbic acetylene floodlight, generator and other Carbic equipment. The Carbic cake-form carbide will be distributed by the Union Carbide Sales Company, New York, N. Y.

WHITE COMPANY, Cleveland, Ohio, has appointed Jay Rathbun a vice-president of the eastern region, with headquarters at 17 Battery Place, New York. Mr. Rathbun has been a vice-president of The White Company in charge of the export department since 1926. He became associated with the company in 1911 as manager of sales for New York State, and in 1914 was appointed manager of export sales, with headquarters in New York.

LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, has appointed Jacob F. Savelle as welding service manager for the Detroit district under the direction of J. M. Robinson, district sales manager.

B. F. GOODRICH RUBBER COMPANY, New York, N. Y., accepted the resignation of Harry Hough. James D. Tew, first vice-president, was elected president to take Mr. Hough's place. Mr. Hough will retain his position as a member of the board of directors and will act in an advisory capacity. Also T. G. Graham, works manager, was elected first vice-president; and T. B. Tomkinson, comptroller, and V. I. Montenyohl, treasurer, were elected to fill existing vacancies on the board.

Speaking of Hand Brakes



—*make this test!*



The
Peacock
Staffless

Slack off the brake until full piston travel is required to set brake; release air brakes; then try to set hand brake.

Will it hold?

If not, it's not a

"Peacock" Staffless Brake!

Reg. U. S. Pat. Off.

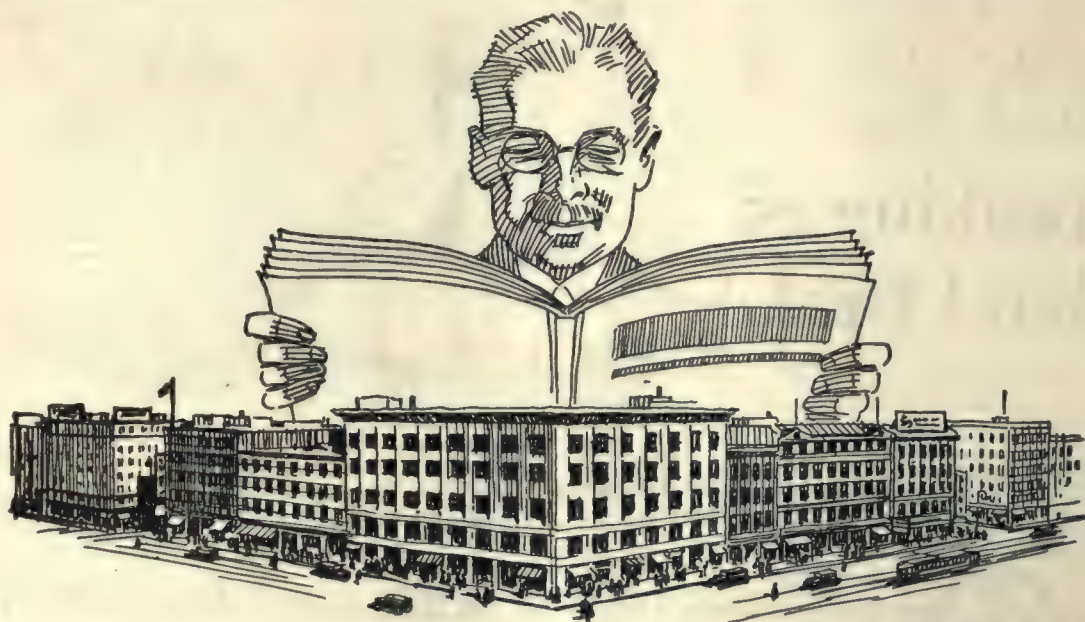
At your request we will gladly send one to make this test.

No matter how badly brake shoes are worn or how loose the rigging, "Peacock" Staffless Brakes insure adequate braking power. They have proved their merit in practice, test and experience.

Additional facts will
gladly be furnished on
request

National Brake Company, Inc.
890 Ellicott Square Buffalo, N. Y.

Canadian Representative:
Lyman Tube & Supply Co., Ltd., Montreal, Can.



He is your business partner

He considers first and foremost your interests.

He is truthful and honest in his dealings with you.

He is not provincial, but his experience is nation-wide in scope.

He is not opinionated, but brings to you unbiased facts, news, and reports.

He has a finger on the pulse of your trade's activities. He promulgates helpful information.

He is in close touch with manufacturers, producers, distributors—those from whom you buy.

He deals with none which has a tendency to mislead or which does not conform to business integrity.

He is a consultant that "sits in" with you regularly. His suggestions are profitable to you.

He holds a fellowship in a select association with exacting standards of membership.

He has pledged himself to determine the highest and largest function of the trade which he serves, and to strive in every legitimate way to promote that function.

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ECONOMY

of
Quality Product



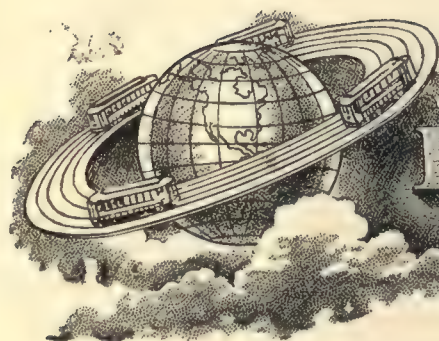
The correct design and high standards of accuracy maintained throughout the manufacture of our products result in long, economical service.

LONG MANUFACTURING COMPANY
DETROIT, MICHIGAN

LONG

LONG PRODUCTS—AUTOMOTIVE CLUTCHES AND RADIATORS

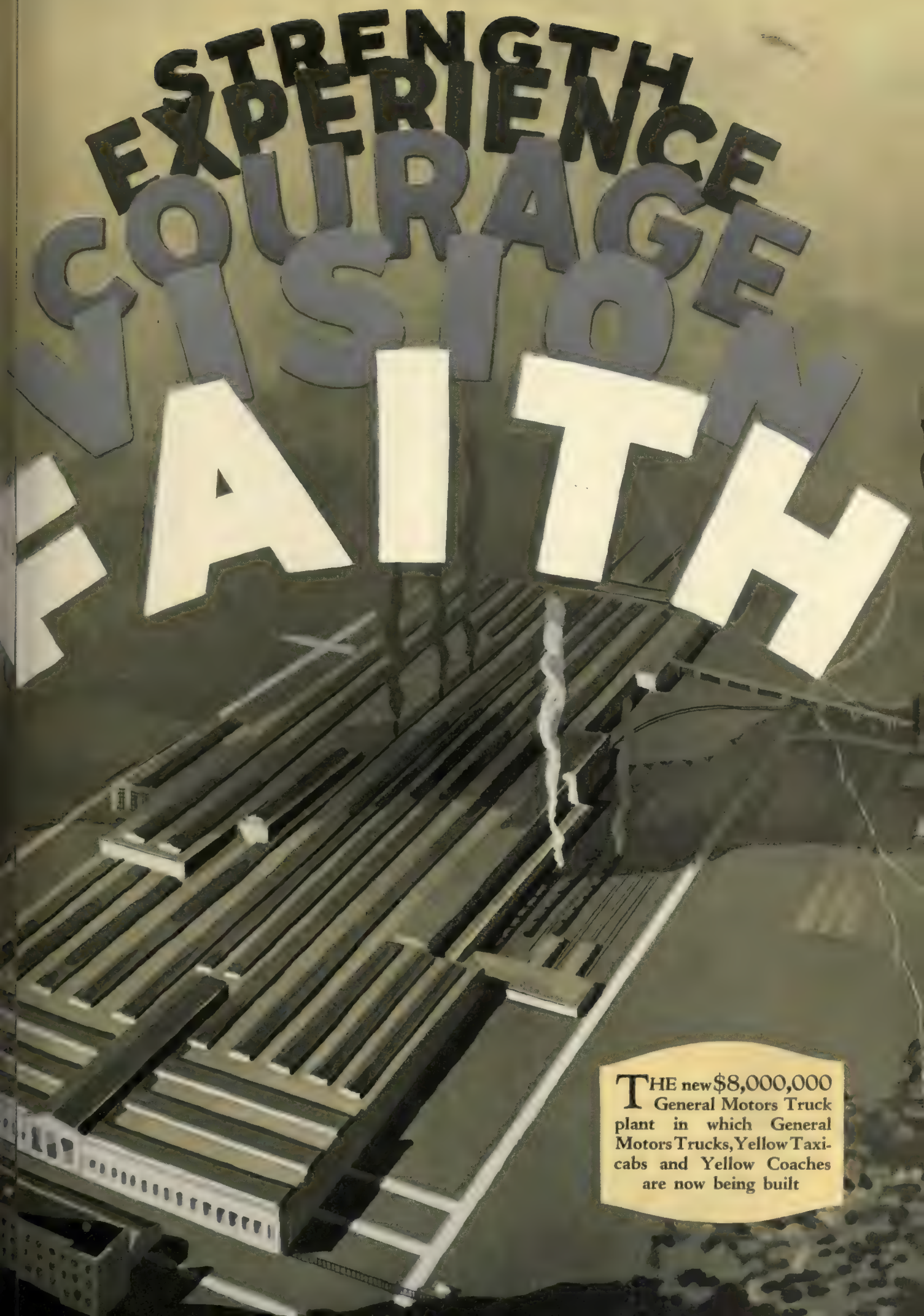
JUST as the electric railway companies have to compile and be guided by exhaustive statistics as to peak loads, traffic densities, costs per mile, and so forth, we must constantly keep ourselves informed as to purchasing power, density of population and all vital market information in order to maintain our service as an active asset of your service.



Barron G. Collier

INCORPORATED

CANDLER BLDG. NEW YORK



STRENGTH
EXPERIENCE

COURAGE

FAITH

THE new \$8,000,000
General Motors Truck
plant in which General
Motors Trucks, Yellow Taxi-
cabs and Yellow Coaches
are now being built



The New Plant for General Motors

Tangible evidence of the unlimited faith
held by General Motors in the future of
Commercial Transportation

GENERAL Motors Truck has spent \$8,000,000 to erect the largest plant in the world devoted exclusively to the manufacture and assembly of commercial vehicles.

FAITH, characteristic of General Motors, built this plant.

FAITH in the future of commercial transportation.

FAITH in the superiority of the products being manufactured and assembled.

FAITH in the appreciation of commercial operators.

To build such a plant took courage.

It called for vision.

It required united strength of organization planning.

It drew upon every division of the great General Motors family for plant experience—

For no one man planned this plant.

Production men and engineers in the Fisher Body plants of the corporation, backed by their years of successful experience in the production of fine body work in tremendous quantities, contributed their advice and recommendations.

From the metal working plants of the corporation from chassis and engine building plants and other manufacturing centers, came other production men and engineers with their advice and recommendations born of personal and successful experience.

These men, with their cumulative and diversified



*On July 5, 1927, ground was broken.
Less than six months later, January
3, 1928, finished vehicles were coming
off the production line*

Truck at Pontiac, Michigan

General Motors Truck, Yellow Taxicab and Yellow
Coach manufacturing now combined and operated
as "General Motors Truck Company"

experience, told of the latest improvements they would now incorporate in their own plants today, were they privileged to rebuild, unhandicapped by expense—

And from the civil engineering division of the corporation came fruitful ideas for plant construction, based on years of experience in the building of plants for highly efficient production.

Focused on the project were thus the best minds in the corporation, drawn from every center and made to yield their viewpoints.

The direct result of this combined

effort and experience shows in the plant as it stands today—a model of efficiency, flexibility and completeness.

Interesting Facts About the Plant



*The present huge
plant is actually only
an initial unit, so
designed that it may
easily be expanded*

For every modern facility for improved production is here, multiplied many times to a point of efficiency that distinguishes this plant as the outstanding achievement in design and construction for production of commercial vehicles.

Building for the Future

Responsible for the building of this great plant were the many economic advantages that result from consolidating under one roof all of the manufacturing



One and a quarter million square feet of floor space—Plant site 156 acres

activities of General Motors Truck, Yellow Taxicabs and Yellow Coaches.

Moreover, General Motors believes in the future of commercial transportation—

In the basic fundamental soundness of the industry.

It believes that the use of motor trucks, taxicabs and motor coaches is sure to expand.

And General Motors Truck recognizes its responsibility to lead the way—to keep in advance of growth—to serve adequately now, and in the future.

To keep faith with the industry and with its own ideals—to leave nothing undone to further industrial progress—to give operators the best that brains and money can achieve in manufacturing facilities and finished product.

These briefly, are the real reasons why there is a new model plant at Pontiac today.

Flexibility Without Sacrificing Efficiency

If ever a plant was built around extreme flexibility of operation on a big scale, without sacrifice of efficiency, this enormous structure is an outstanding example.

In a passenger car plant the building problem is geared to an even flow of production of a few different models. Such a problem is simple as compared to the task that confronted General Motors Truck in the building of the Pontiac plant.

Here it was necessary to take into account the large range and diversity of sizes and models of General Motors Trucks, Yellow Taxicabs and Yellow

Interesting Facts About the Plant

Forced draft unit type heaters provide ventilation and heated fresh air to every corner of the plant

Coaches that are required by commercial operators.

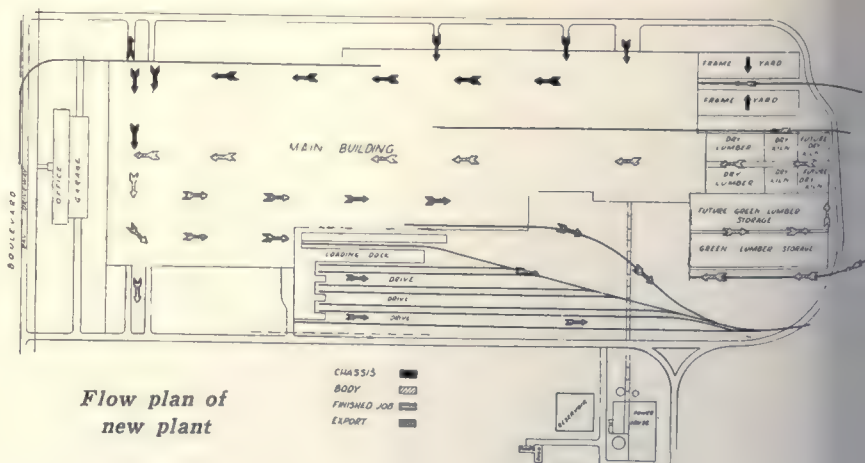
It was necessary to provide for the peaks and valleys in the production requirements of different classes of commercial vehicles; to provide an excess of capacity to meet seasonal demands for any one class of vehicle and to utilize this same excess at other times for other production purposes.

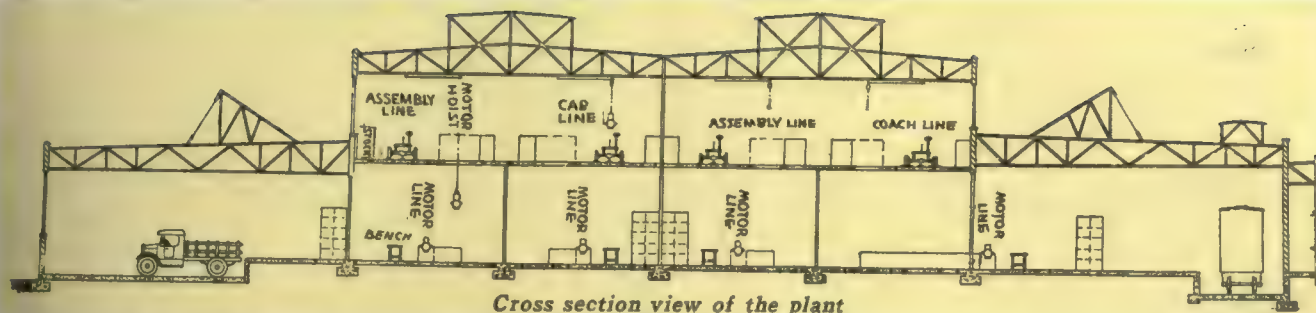
And specialization must prevail, with three distinct types of commercial vehicles being manufactured under one roof—motor trucks, taxicabs and motor coaches—each type must be kept separate and receive the exclusive attention of trained specialists.

Counting the body production, there are actually four great plants working in harmony at Pontiac, each with its own production crews, production lines and sub-assembly departments.

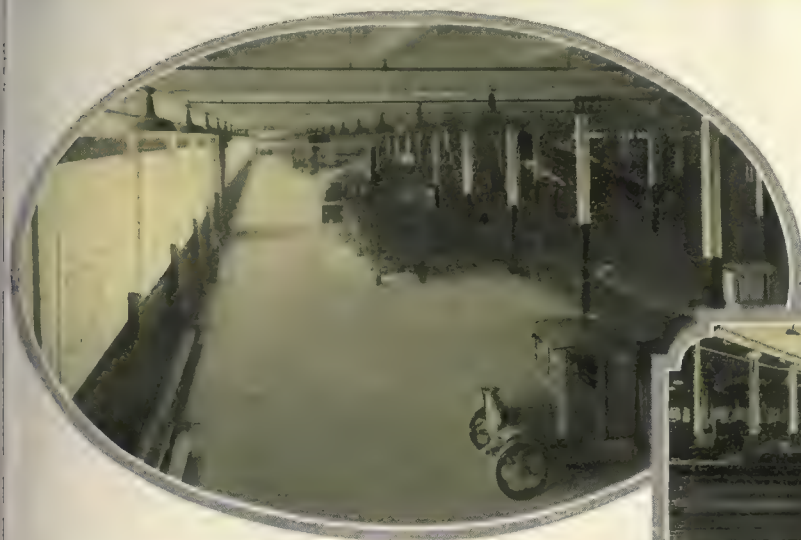
Imagine, if you can, a plant under a single roof almost half a mile long and 620 feet wide.

A plant in the course of whose construction was poured enough cubic yards of concrete to cast five Washington Monuments solid, or lay a four-foot sidewalk 402 miles long.

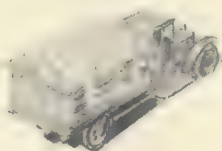




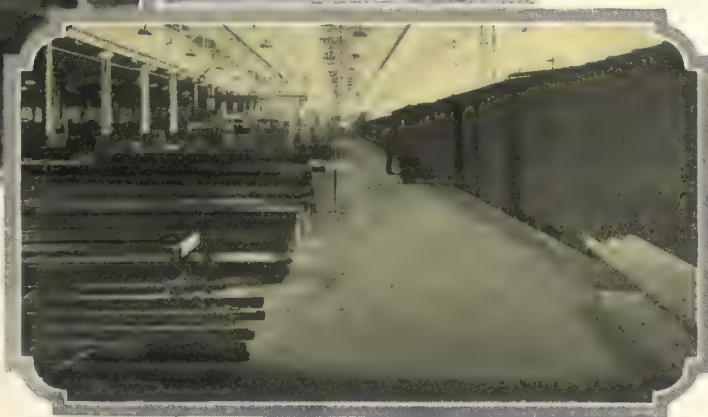
Cross section view of the plant



The receiving platform for incoming truck freight and electric railway freight is 1500 feet long



Receiving platform for rail freight. All incoming material is delivered directly to the assembly points



A plant in which 18,000,000 pounds of structural steel were used, enough if rolled into a ten-gauge wire to encircle the earth more than two and one-half times.

A plant in which the board feet of lumber used in construction would build homes for more than 3,000 people.

A plant of this size is necessary to house the manufacturing and assembly of the different types of commercial vehicles turned out and to give to each the specialization required.

It is worth noting, too, that even this huge manufacturing institution does not completely satisfy General Motors' faith in the future of commercial transportation.

The present plant is in fact the initial manufacturing unit, being so designed that it may be expanded readily many times its present area, without disturbing present sewer lines or equipment. Sewers, water mains, steam lines, electric supplies and all similar facilities are designed to take care of a plant of much greater area than this initial 1,250,000 square feet of floor space.

Flexibility Shown in Flow of Work

It is when one studies the flow of production that the true significance of General Motors Truck planning becomes apparent. It is then that one grasps the foresight that makes it possible for a variety of commercial vehicle units to be handled under one roof, with specialization applied to each.

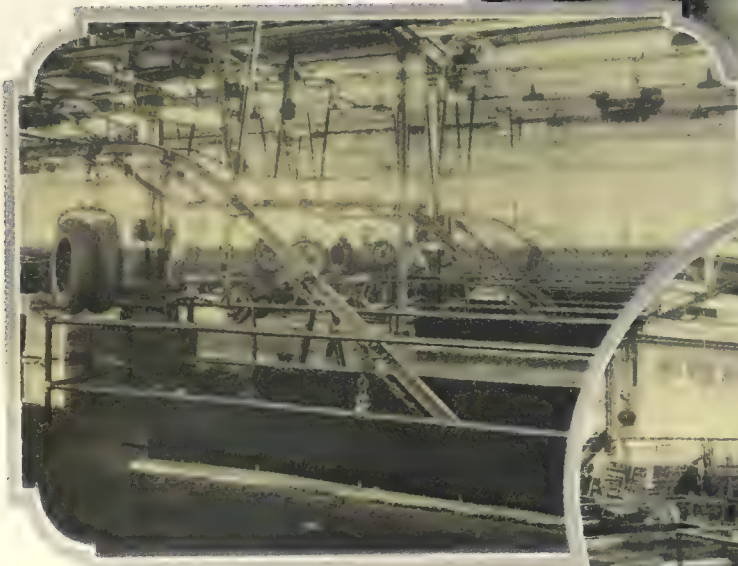
Running down one side of the plant for a distance of 1,500 feet, and paralleling the left of the assembly floor, are the receiving platforms for incoming truck freight and electric railway freight. And duplicating this on the right are receiving platforms for incoming rail freight.

Standing at one end of these two long, receiving platforms, one can scarcely see to the other end.

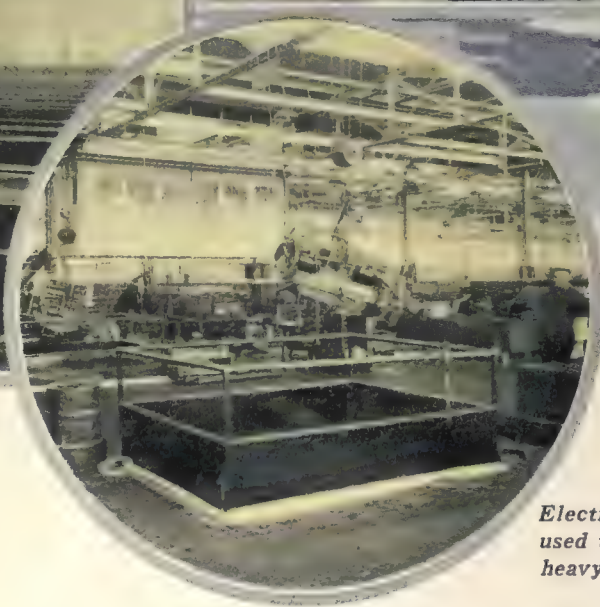
In between the two platforms the sub-assembly chassis operations—18 in all—are carried out; these include such items as a cowl assembly, power plant final assembly, tire and wheel assembly, etc.

The material required by such assembly depart-

On the assembly line



Conveyors are used to deliver material from sub-assembly to assembly lines



Electric hoists are used to handle heavy units

ment is delivered by truck or rail car right at the assembly point. Material is lifted from truck or freight car directly onto the proper sub-assembly line. There is no duplication of handling, no waste effort and no confusion.

This plan for receiving incoming materials is entirely new in plant arrangement; a practice developed by General Motors Truck. Usual plant practice provides for one common receiving point for all incoming material; a method that invariably means re-handling, internal haulage, duplicated effort and unnecessary expense. In the new plant at Pontiac, the internal haulage problem has been reduced to a minimum.

Each sub-assembly department specializes in the production of a single complete part or unit, such as the assembly of the tire, tube, rim and wheel into one unit.

The observer who inspects this great plant will be struck by the ingenuity of the conveyor methods employed for delivering the assembled chassis units to

the final chassis assembly lines on the floor above.

A system of electric escalators, conveyors and hoists speeds the completed units on their way. There is practically no trucking of material through the plant, no clogging up of aisles, no wasted footsteps—none of the scurry and confusion usually found in a big production plant. Quiet orderliness prevails, yet the various units, when completely assembled, literally take wings and fly to their point of final assembly.

Specialization Prevails Throughout

It has already been stated that each sub-assembly department is made up of specialists in the assembling of but one unit or part.

Each of these departments in turn is divided into four separate divisions, each specializing solely in the assembly of light or medium, semi-heavy or heavy duty units.

Throughout the progress of these parts

Interesting Facts About the Plant

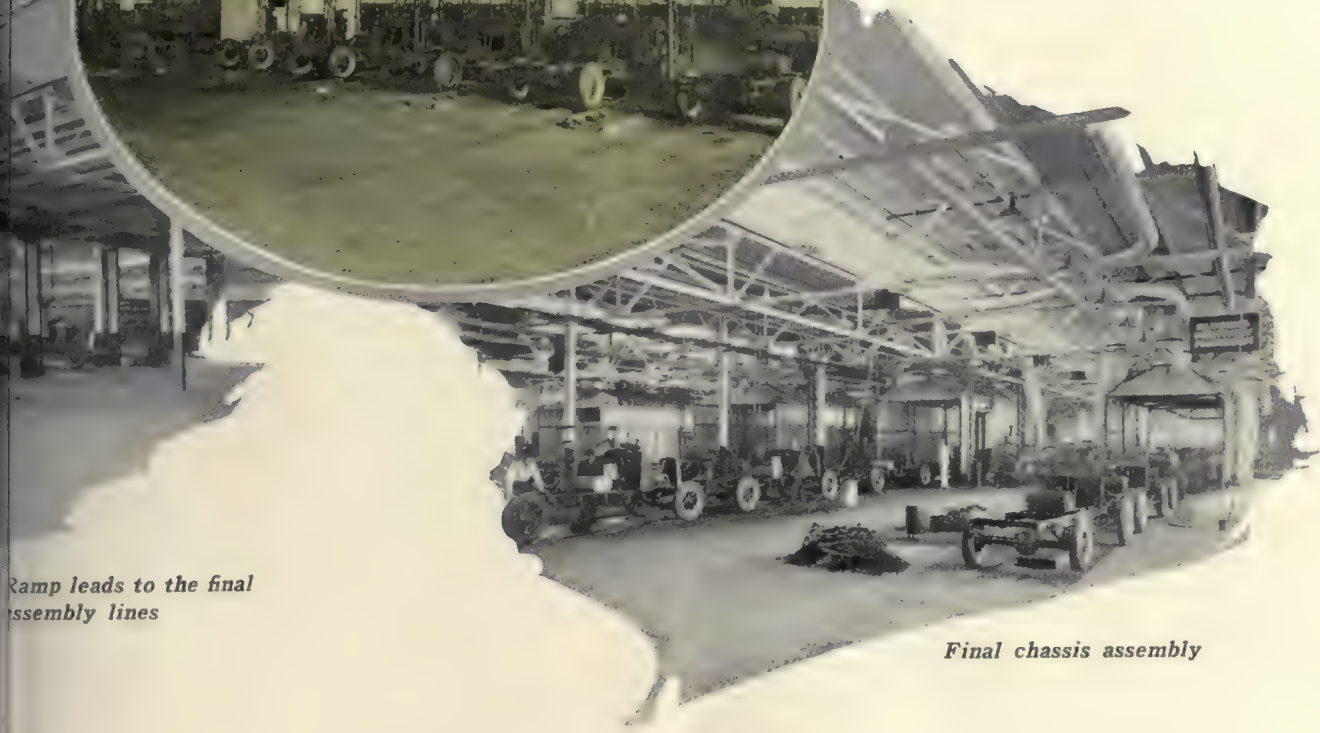


Within six months after ground was broken, the plant was in production.

July 5th to January 3rd



*The dynamometer
test line*



*Ramp leads to the final
assembly lines*

Final chassis assembly

through the plant, from sub-assembly to final assembly and test, these four classes of material are kept separate and distinct, each class of material flows along its own individual production lines with its own crew, highly skilled in one range of work.

Leaving the sub-assembly departments, we find that in the assembly of the complete chassis units, the system of individual production lines for each class of vehicle likewise prevails.

Here the vehicles systematically take shape as the moving assembly lines crawl slowly forward. Springs are added to frames; axles and wheels follow. Electric hoists deftly slip motors into place. There is a trained crew for each step—for each adjustment—for each test.

As you watch the vehicles take form you cannot help but sense the remarkable efficiency of the progressive assembly system employed. There is a complete elimination of labor waste. Ingenious electrical lifts, conveyors and

mechanical equipment make the actual handling of parts unnecessary. Machinery, built to perform manual tasks with human skill, takes the place of common labor. The heaviest parts are slipped into their appointed places in the chassis as neatly and easily as chess pieces. It is from this point on that skilled labor steps in to make necessary attachments, adjustments and tests.

Ordinarily a factory is proud of two or three dynamometers, but here a whole battery of them, twenty in all and extending the complete width of the building, are ready to receive the finished chassis as they roll off the assembly line. On these dynamometers each finished chassis is run in under its own power, and at the same time is forced to reveal its innermost mechanical secrets to unsympathetic gauges that register its very heart throbs.

It is an inspiring sight to see this long row of vehicles "on test," recording their efficiency.

Following the running in period and

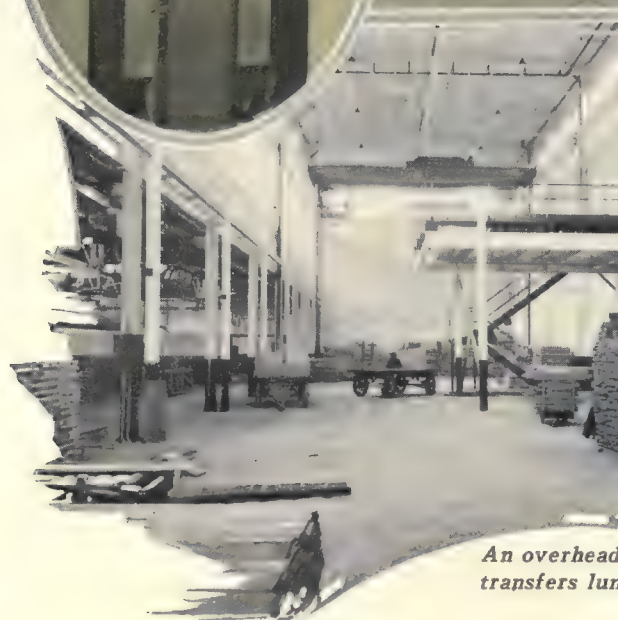
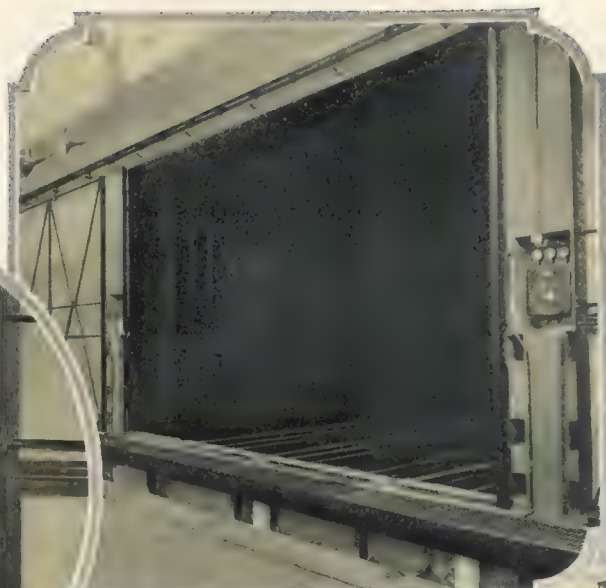
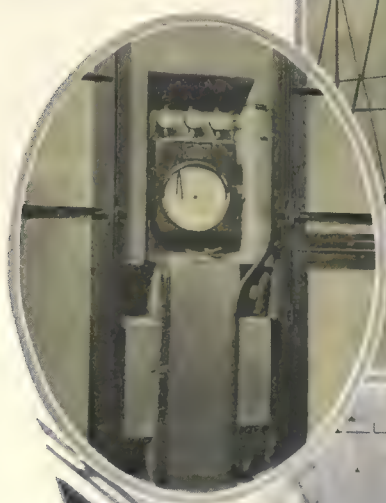
Interesting Facts About the Plant

*Every window in
the plant can be
opened or closed
from central points
in five minutes*

One of the wood treating kilns open

The kilns are precision regulated

The Dry Storage is adjacent to the kilns



An overhead traveling crane transfers lumber by the carload

A battery of wood treating kilns

dynamometer test, the chassis then proceeds forward to the final chassis assembly line where lamps, hood, fenders and baked enamel parts are installed prior to attaching the body.

The Body Plant— A Model of Efficiency

The body plant, while under the same roof as the chassis assembly, is an institution in itself.

Body building, at Pontiac, starts with the treatment of the selected timber.

A long battery of huge wood-treating kilns receives the lumber as it comes into the far end of the plant from the storage yards—yards in which half a million feet of lumber can be easily stored. Heat and moisture conditions

are precision regulated to insure long life, strength and freedom from warping.

Following this treatment, the timber is transferred to dry storage, adjacent to the dry kilns. From here, a great time and labor saving crane, travels back and forth, delivering huge stacks of lumber as needed, to points adjacent to the saws.

Interesting Facts About the Plant



Waste wood in the body plant is converted into sawdust and operates one of the big boilers in the power plant

In the wood working department, as in other departments, tools and equipment which minimize manual operations predominate. Duplicated handling of material is eliminated. Cutting is done over jigs to insure complete uniformity and accuracy.

In the sheet metal department, huge shears and presses cut and shape the metal into forms. Modern welding equipment joins the formed sections. Every-

where, the very latest mechanical devices speed the work. Traveling cranes shift the piles of raw material about. Conveyors speed the units near completion to the various sub-assembly departments.

Here, as in the chassis assembly, the system of limiting each department to one class of body work prevails, the production lines—four in all—each specializes in the assembly of bodies for but one class of vehicle, and special provision is made to meet the widely divergent conditions pertaining to each class of work. Yellow coach bodies are built in many varieties of models, with many special features involved. Capacities range from 17-passenger parlor cars to double deck coaches for 65 passengers. Yellow taxicabs are produced in several models, with many options in body design. General Motors truck bodies must be built in many different types and sizes.

Such production means that each production line must be especially equipped and fully prepared to meet the wide range of conditions imposed.

Because of their size, extra large paint spray booths are required for the coaches and great overhead traveling cranes are used to facilitate handling.

The body plant division parallels the chassis division and the different production lines of the two converge at the finish where bodies are mounted on chassis. The completed vehicles are then ready for final inspection, tests and shipment.

Interesting Facts About the Plant



*Parking space for
2,500 cars is
provided for
the employees*

The Export Department

Chassis intended for export are disassembled after being completely assembled and tested.

Since nearly every vehicle shipped for export has some characteristic difference, the building of export crates is practically a custom proposition. Because of this the crates are built up on a line directly adjacent to the dis-assembly line, thus providing a quick check and eliminating much blue print handling. All parts and chassis sections are carefully packed and ready for quick re-assembly when the vehicle reaches its destination.

An Invitation

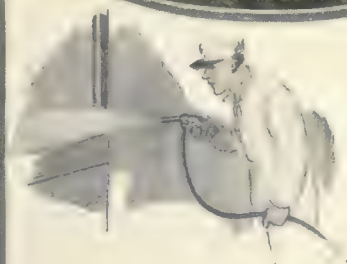
Word pictures and printed illustrations cannot adequately describe the extensive facilities and efficiency methods employed in this new model plant at Pontiac.

To really appreciate its size, its capacity and its flexibility of operation and the means employed to reduce labor waste and improve efficiency of production, it is necessary to visit and inspect this plant in person.

Come to Pontiac if you can.

Anyone interested in commercial transportation, whether manufacturer or operator, will always be welcome.

Paint spray booths are of the latest design. Note the giant booths required for the coaches



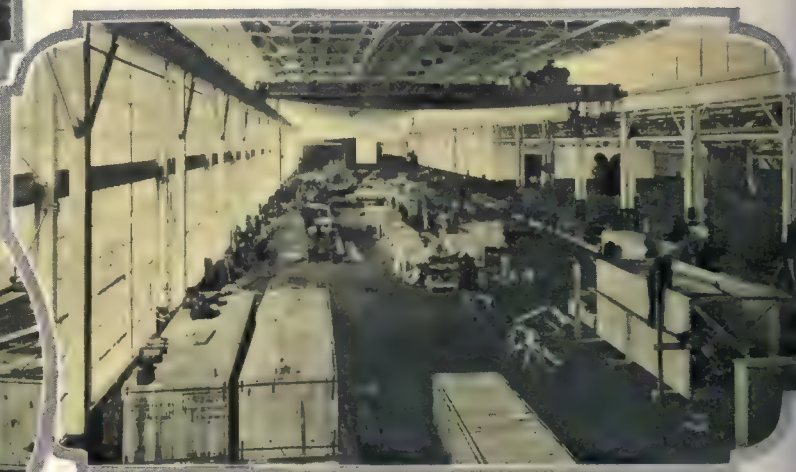


*Between body mount
and shipping
warehouse*

*Warehouse
for finished
product*



*Left—Export shipment—Partially disassembled,
the component units of the vehicle are placed
upon the export case bottom. Note vehicles
in background in process of disassembling*



*Export packing and
shipping dock*

*Export shipment—An electric crane
transfers the boxed vehicle
from boxing rolls to freight car*

Interesting Facts About the New Plant

THERE were 750,000 cubic yards of earth excavated or enough to clear a hole as large as an ordinary city block, 169 feet deep.

During the construction, there were 80,000 cubic yards of concrete poured or enough to cast five Washington monuments solid, or lay a four-foot sidewalk 402 miles long. In this concrete, 400,000 sacks of cement were used or enough to load a train of 570 box cars—5½ miles long. And two million pounds of reinforcing steel were used in this concrete, enough, if rolled into one-quarter inch rod, to make a rod long enough to reach more than half-way from Portland, Maine, to Portland, Oregon.

There were 4,500,000 board feet of lumber used in construction or enough to build homes for more than 3,000 people.

There were 500,000 square feet of glass used—54 solid carloads—enough to put 11½ acres of land under glass.

There were over 3,000,000 brick used, which would build a single garden wall six feet high and 13½ miles long.

The floor was covered with enough wood blocks and asphalt blocks so that if they were moulded into a shaft one foot square, they would reach a height of 50 miles or would cover a sidewalk four feet wide, long enough to reach from the City Hall in Toledo to the City Hall in Detroit.

Over 50,000 cinder blocks were used.

18,000,000 pounds of structural steel were used.

Throughout the entire plant every modern electrical device has been installed, both for human safety and for maximum production efficiency.

Electrically operated horns sound the starting and stopping signals.

All doors are electrically opened and closed. All windows can be opened or closed from central points in five minutes.

Time clocks are electrically controlled from a master clock. All machinery is individually driven by electric motors, with safety switches and controlled by start and stop buttons located in such positions as to guarantee the safety of the operator.

Electricity plays an important part in the operation of the power plant. Electrical machinery carries the coal from the car or coal pile to a crusher, feeds it into the boilers and carries away the ashes. Electric meters test the temperature inside the fire boxes, measure the flow of steam and check any possible losses of heat in the smoke stack.

The plant is completely supervised by an electric fire alarm system, a calling system and a sprinkler alarm system.

In this plant large quantities of gasoline and Duco are used daily. The storage of these inflammable liquids within the plant has been entirely eliminated. A workman desiring to use either gasoline or Duco at any point in the plant merely opens a valve and automatically the liquid is pumped from a station 3,000 feet away. The valve is self-closing and furthermore, in case of emergency, the entire system can be shut off and promptly drained by use of conveniently located stop buttons.

To provide light and power immense quantities of electrical materials were installed. All main feeders are underground in fibre duct. This duct, if laid end to end, would make a 4 in. tube, 72,000 ft. long. The lead cable used in the underground system, reduced to a size as thick as a broom handle would extend 36 miles. The wiring to all equipment is enclosed in steel conduit. The conduit used, if formed into a single pipe ½ in. in diameter would reach from the City limits of Detroit to the City limits of Cleveland, Ohio. The wire used, if reduced to the size ordinarily used in house wiring, would reach from New York City to St. Louis, Mo.

This is one of the best lighted plants in the world. There are over 12,600 reflectors for lighting in the plant. These reflectors, if stacked in their shipping cartons would make a tower over 2,500 ft. high, or more than four times as high as the Washington Monument. The lamps installed in these reflectors would furnish sufficient lighting for 1,850 homes and if placed in a single headlight would throw a beam of light strong enough to make objects plainly visible at a distance of 17 miles.

Approximately 93 miles of iron and steel pipe are used, of various sizes. 64 miles of pipe are necessary for fire protection, 10 miles for heating system, 6 miles for drinking and service water, 4 miles for carrying away rain water, 3 miles for sanitation, 3 miles for air supply and 2½ miles for oil and gasoline.

Unit type heaters employing forced air draft assure proper ventilation and even temperatures.

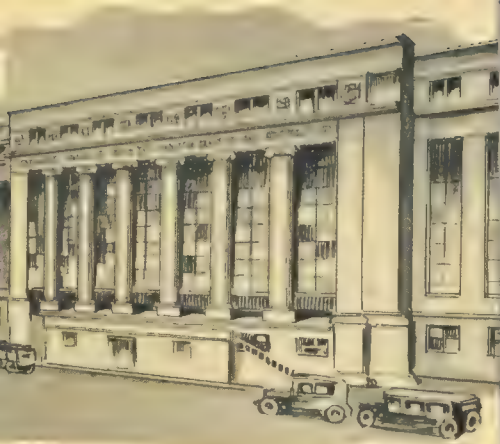
58 Frigidaire drinking fountains supply fresh cold water for the workers.

Were size alone the only consideration, this great plant would fall merely into the class of other big industrial structures. In this case, however, size of structure signifies the elaborate care taken by General Motors Truck to erect a plant large enough to render to each type of vehicle the specialization which assures the operator the greatest economy, the finest class of work and faithful performance on the road, coupled with low maintenance.

Behind such indications of progressiveness, lies an ideal. General Motors Truck has left no stone unturned to assure operators the maximum in performance and economy. The entire industry represented by operators of trucks, taxicabs and motor coaches thus shares in this new plant at Pontiac.

Faith, vision, experience, courage and strength built it.

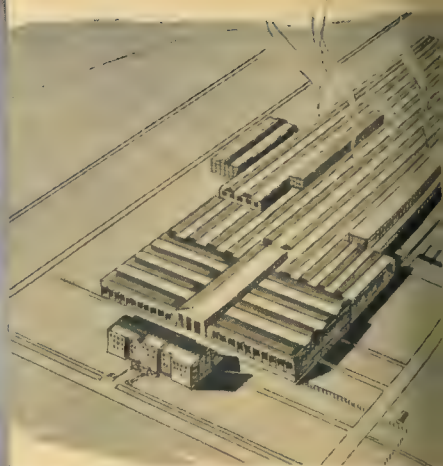
"There is no substitute for experience and financial responsibility."



The research laboratories



The proving ground



The new plant at Pontiac

Out of These Welded Interests—

IN the General Motors Laboratories where research engineers are continually experimenting with materials, judging the value of suggested improvements and analyzing the worth of new developments.

On the General Motors Proving Ground where the strength and stamina of General Motors Trucks, Yellow Cabs and Yellow Coaches are put to the severest test under gruelling operating conditions that reveal the truth of performance.

In the new plant at Pontiac where every modern facility for manufacture, assembly and test is engaged in turning out the finished product.

Out of these three welded interests, working in

harmony, are developed General Motors Trucks, Yellow Taxicabs and Yellow Coaches. They indicate the determination on the part of General Motors to lead in the commercial vehicle transportation field with a type of truck, taxicab and motor coach for every need. Specialization at every stage of planning and building assures to the operator reliability of performance and economy of operation and maintenance.

The manufacturing and sales activities of the Yellow Truck & Coach Manufacturing Company are now consolidated in this new plant at Pontiac, where operations will be continued under the corporate name of

General Motors Truck Company
Pontiac Michigan



102 YEARS OF MANUFACTURING EXPERIENCE

Cane Webbing may
be ordered through
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No. 327 C

For New Cars or Replacement Use

Here is a good-looking, long-wearing, reversible seat that will help you reduce the equipment cost for new cars or for replacement improvements. The 327 C is fairly inexpensive, yet it embodies all the mechanical betterments of our higher priced seats. This modern style has a soft, comfortable spring back and a deep, single-spring, six-inch cushion. The reversing mechanism, made of malleable iron to withstand hard service, is positive and easy in action.

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*If you have not received a copy of our
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Hayward, Liberty Trust Building, Roanoke, Va. The Railway &
Power Engineering Corp., 133 Eastern Ave., Toronto; Montreal;
Winnipeg, Canada.



—and the band played "There'll be a hot time in"

TWO years ago one night in June fifty thousand friendly voices broke into cheer after cheer as a mammoth bonfire of old Grand Rapids street cars climaxed the celebration that began a few days previously. The whole city declared holiday to witness a gala parade of new cars that replaced those consumed in the flames. The opposition of press, city officials and public had been transformed into enthusiasm, confidence and co-operation with the local railway.

Refused to Take the Count

Grand Rapids is only one of many examples of the come-back that is being staged by the electric railway industry. Atlanta, Pittsburgh, Chicago, Cincinnati, Cleveland, Richmond, Ft. Worth, Youngstown, Boston, Kansas City, Toronto, Houston and numerous other cities and localities have also made noteworthy progress. The industry hardest hit by the war and post-war turmoil is on the mend.

The come-back trail was blazed by a McGraw-Hill publication. While politicians rode into office on the 5-cent fare issue, when the automobile and the jitney ate into street railway revenue, when miracles in economies failed to stem the ebbing tide of income, but only made the car ride less attractive—in those seem-

ingly hopeless days *Electric Railway Journal* never for a moment lost its confidence in the basic soundness of the local transportation industry. It devoted every resource at its command to inspiring local transportation companies to fight their way out of the wilderness.

Business Journalism in Action

Electric Railway Journal maintained that the solution lay in two directions: First, in modernizing equipment and improving service so as to make the car ride attractive; second, in developing the bus as a de luxe service and co-ordinating it with existing rail service. By thus satisfying the demand for comfort, speed and faster schedule, *Electric Railway Journal* contended that patronage could be won, labor and public relations improved, and fare and other franchise difficulties relieved.

To win acceptance of this program throughout the industry, every publishing resource was used—news articles, editorials and research, meetings and personal conferences with operators, associations, manufacturers and bankers. *Electric Railway Journal* showed that modern equipment would quickly pay for itself in operating economies. Later car and equipment



NEW CARS FOR OLD — Grand Rapids, June 13, 1926, when the city's populace turned out to look over new street cars that were built on "specifications by the public."

the old town tonight"



builders and other agencies took active part in the campaign. Their industrial advertising was effectively teamed with the editorial program. Finally operating companies began adopting the new methods; the rift in the clouds appeared.

This modernization campaign won for *Electric Railway Journal* the 1927 award for the most outstanding editorial service by a business paper to its industry. The award was given by Associated Business Papers, Inc., a non-profit organization of the leading business papers, whose purpose is to stimulate achievement in business journalism.

An Every-Day Editorial Job

In the same purposeful way, each McGraw-Hill publication works in its field for better conditions, better production methods, better products, better marketing. *American Machinist* campaigns for modern machine tool equipment in the metal-working

industries; *Engineering News-Record* for year-round construction work; *Coal Age* for mechanization of the mines; and so on. Receptive markets are a natural by-product of such editing. It dredges the advertising channel to those markets.

The readers of McGraw-Hill publications are the decision men of Industry, the men who must keep in touch with developments vital to their progress. Because each industry needs and reads its McGraw-Hill publication, there is created a direct avenue of approach to the responsible men of industry. Thus through industrial advertising in these publications, waste is eliminated and results increased.

How to make better use of such business papers is shown by one of McGraw-Hill's researches, "Industrial Marketing at Work." Manufacturers selling to industry, their advertising agents and their bankers are welcome to a copy by addressing the nearest office listed below.

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The driving wheels on the engine that pulls the Transcontinental Limited are matched on each side. They work as a team.

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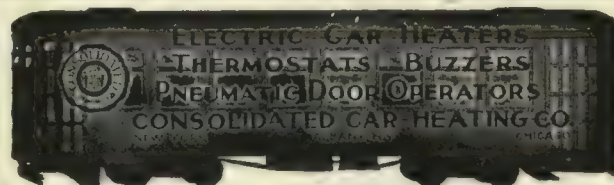
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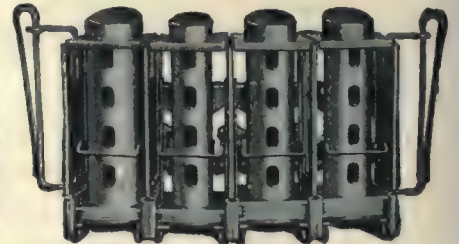
JOHNSON FARE COLLECTING SYSTEMS



Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

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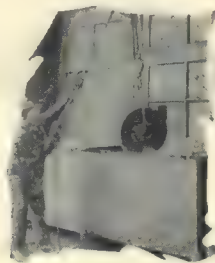
Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates. It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.



Johnson Fare Box Co.

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Speed up repair work!



SAVE many valuable minutes on repair jobs—reduce labor—promote efficiency all around by cleaning car trucks, housings, bearings, castings and other parts with Oakite Railroad Cleaner. It is the easiest and quickest way to remove grease, oil and muck. The *money-saving* way to clean!

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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Wm. Wharton, Jr. & Co.

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(Continued on page 46)

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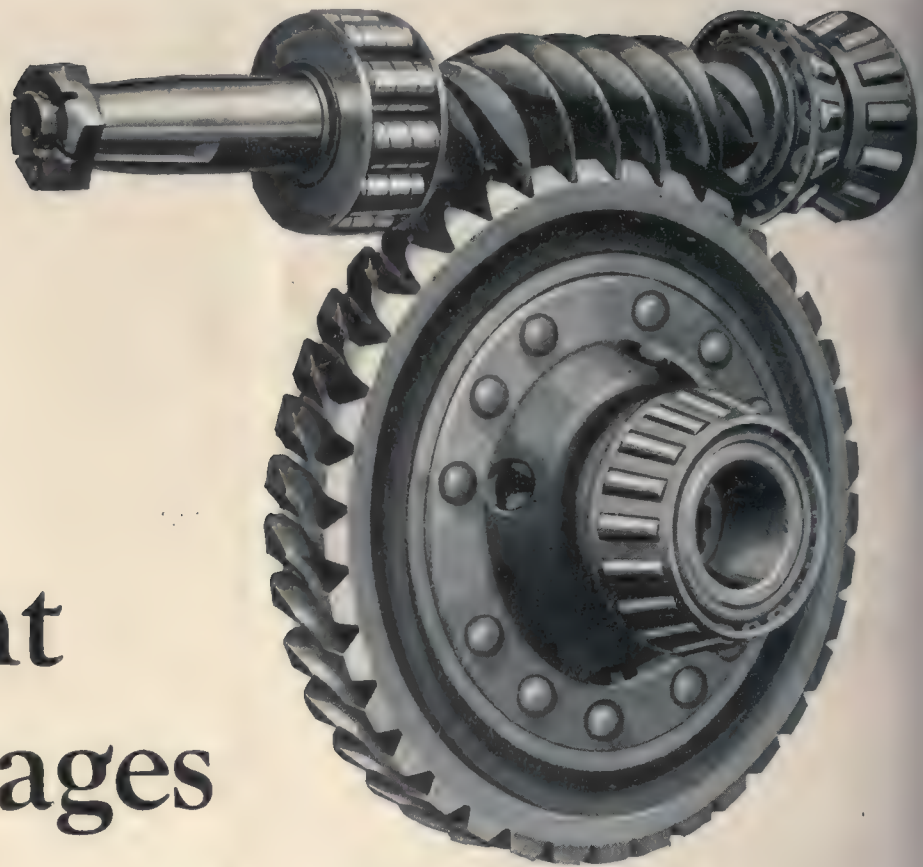
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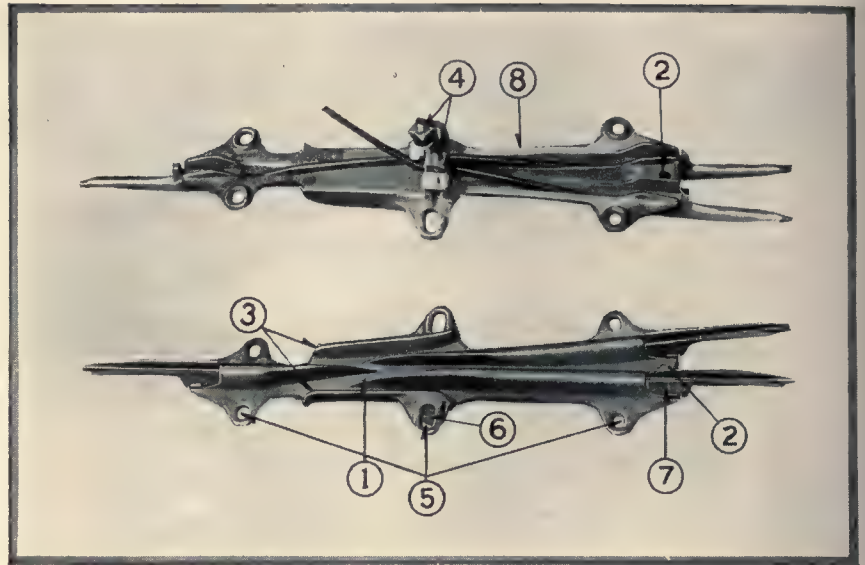
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Solving the Baffling Traffic Problem

WITH constantly increasing intensity traffic congestion presses for relief in every large city and in many small communities. As the traffic situation grows more and more acute its many complex and inter-related factors are scrambled in a baffling tangle that continues to take a heavy toll in loss of time, money and human life. The traffic problem threatens the very existence of large industrial and commercial communities as we have come to know them today.

Much has been done, however, for relief. Chicago has banned parking in its Loop area, Detroit is experimenting with express trolleys, and numerous cities have adopted the progressive signal control system. Perhaps the most outstanding work has been the series of traffic surveys conducted in many population centers. These surveys are comprehensive studies which seek to analyze the traffic and transportation problem for an entire community, to the end that remedial measures may be developed from facts instead of opinions, and may be based upon broad economic principles instead of short-sighted expediency.

Many of these traffic and transportation surveys have been presented in the pages of ELECTRIC RAILWAY JOURNAL during the past several years. A number of others are scheduled for the near future. The first section of the Detroit report, made by the Police Department of that city, is printed in this issue. This will be followed soon by an abstract of a survey in San Francisco and subsequently by the recently completed Milwaukee survey.

Digests of these reports are so made as to present only data, charts and conclusions considered of general interest and permanent value. This is a timely and time-saving service to JOURNAL readers. It brings to your desk the latest available data on the traffic and transportation problem—stripped of its bulk.

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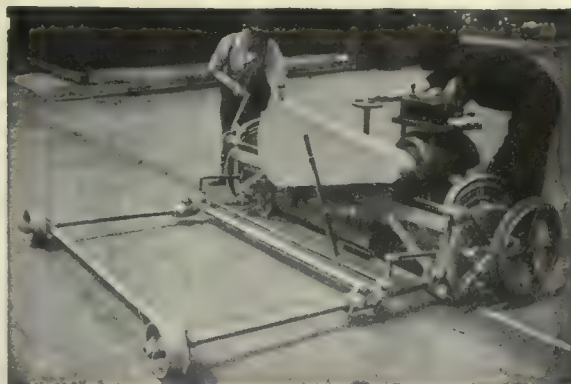
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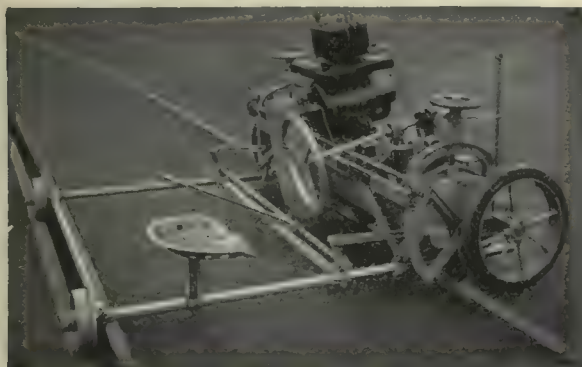
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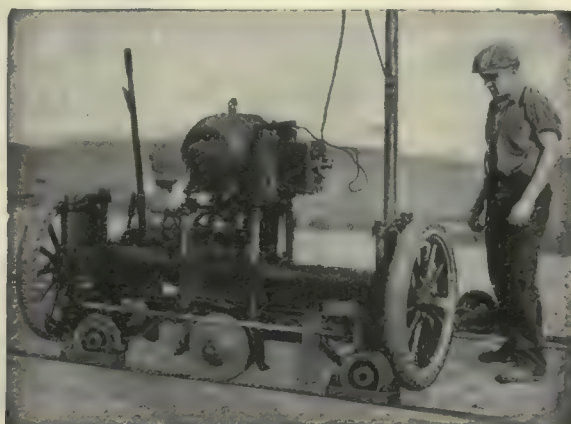
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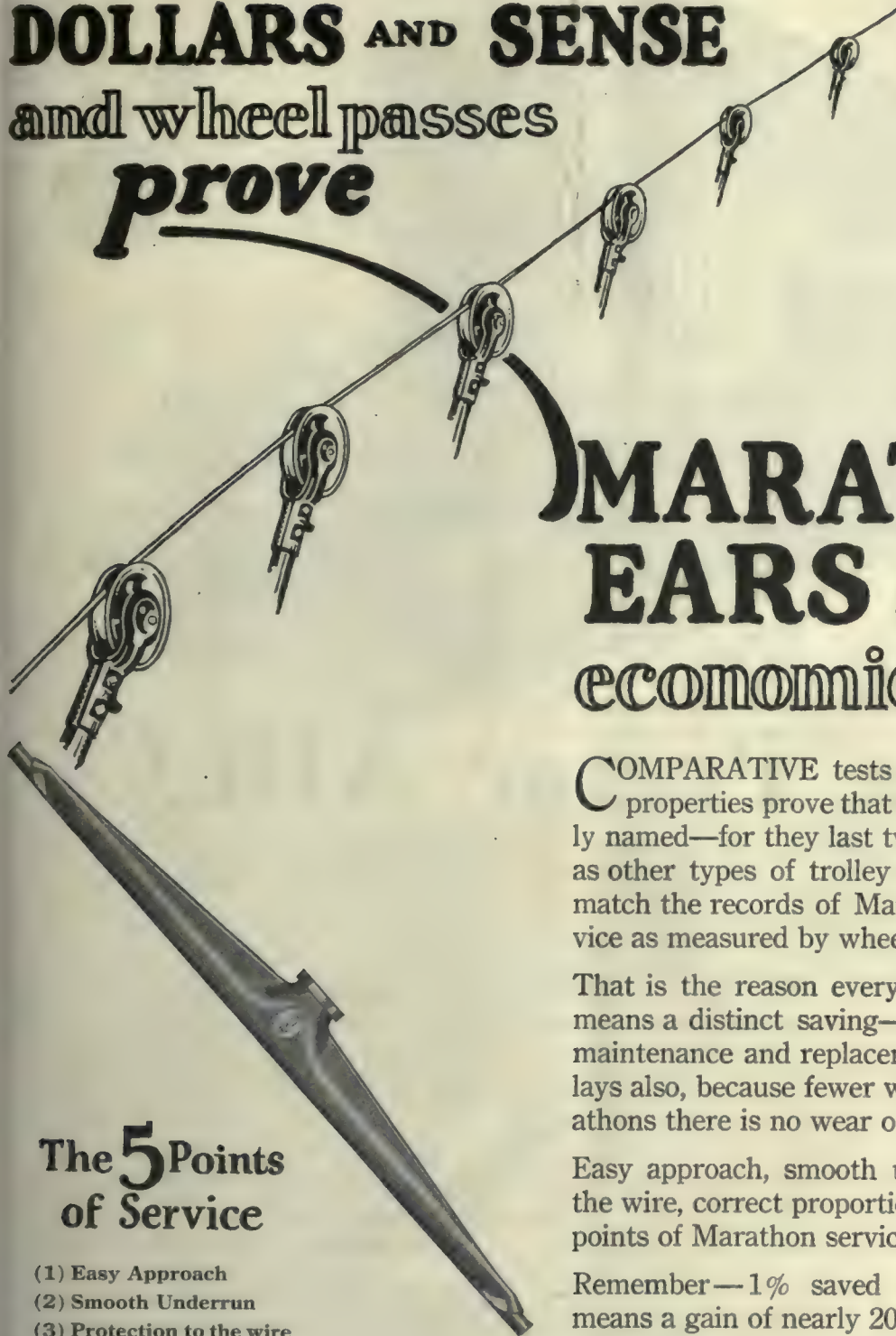
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Any railway which uses anything other than a thoroughly proved type of rail weld, risks not only the cost of the weld itself, but also an investment in the track, worth fifty times the cost of a joint.



The Thermit Insert Weld which has been used in electric railway work since 1912, is basically the same today as then. The only changes have been in a simplification of the process and a reduction in the amount of material used, with corresponding decreases in the cost of installation.



METAL & THERMIT CORPORATION
120 BROADWAY, NEW YORK, N.Y.

PITTSBURGH

CHICAGO

BOSTON

SOUTH SAN FRANCISCO

TORONTO



Make the most of your highways

VERSARE Six Wheel Highway Units offer the following very definite advantages from the standpoint of passenger carrying efficiency:

Practically every inch of the entire vehicle available for useful load.

No awkward seating arrangements.

The "circulating load,"—in the front, out the side.

One man operation, with 37 seated and 37 standing passengers.

Duralumin sectional bridge-truss frame construction, amply strong to stand any reasonable overloads.

Compact vehicle design, easy to handle and park in traffic.



Versare

Every convenience . . .



Showing the low step and wide front entrance to the Versare Six-Wheel Highway Unit. Utmost convenience here, with no waste space.



Above, the rear door equipped with automatic treadle.

To right, interior view showing wide aisles, and ample standing room near exit door.

General Specifications

Engine:	Heavy duty 6 cylinder 125 hp.		
Electrical Equipment:	Versare-Westinghouse Type 177 generator; two Versare-Westinghouse 33 hp. vehicle type motors; Westinghouse standard vehicle control equipment.		
Brakes:	Westinghouse Air on four wheels. Mechanical hand brakes on two wheels. Resistor for electric braking in emergency.		
Axles:	Versare-Eaton, both front and rear. Patented Versare Equalizer on rear truck.		
Wheels:	Van Type 728.		
Body:	Duralumin truss construction.		
Doors:	Front, 36 in. duplex outward folding. Rear, 29 in. dual complex outward folding with or without Automatic Treadle control.		
Length:	28 ft. 29 ft. 11 in. } overall.	Wheel- base {	180 in. 195 in.
Breadth:	8 ft. overall. Aisle width 21 in. at seat base. 24 in. at seat back.		
Height:	9 ft. overall. Headroom 6 ft. 6 in.		
Turning Circle:	56 ft. 59 ft.		



every comfort

railroad efficiency in a highway vehicle!



Front end view of Versare body framework. Note the rigid channelling and girder trusses.

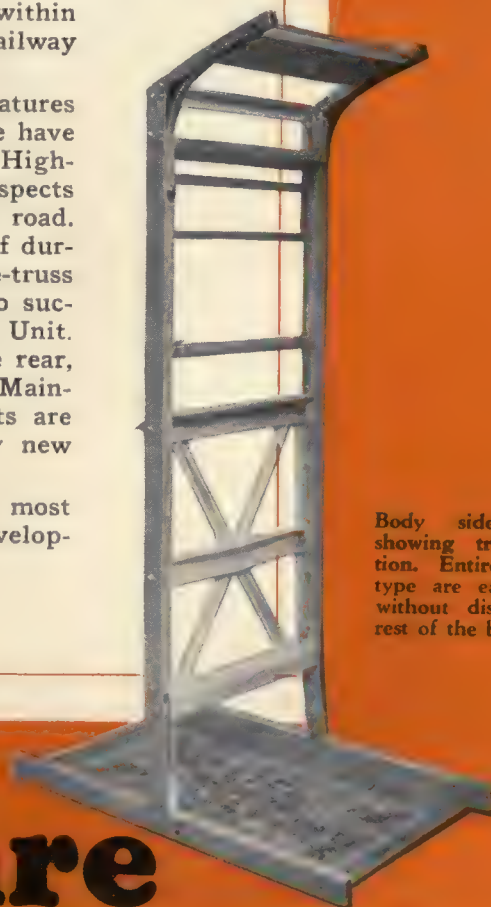
THE Versare Six Wheel Highway Unit has been produced specifically to meet requirements where highway transportation must be provided on a basis comparable to that furnished by the electric car.

It is large enough to carry peak loads in average city operation. It is economical enough to provide frequent service on the base schedule. It is fast enough, and comfortable enough to handle the long suburban runs.

Versare engineers have worked deliberately to produce a highway transportation unit that would provide the comforts demanded by the present-day riding public at an operating cost within the possibilities of existing railway revenues.

While many of the best features of current automotive practice have been incorporated, the Versare Highway Unit differs in many respects from any other vehicle on the road. It has no chassis. It is built of duralumin on the same bridge-truss principles that have proved so successful in the Versare 8-Wheel Unit. The engine is mounted at the rear, and instantly accessible. Maintenance and depreciation costs are so low as to set an entirely new standard.

Certainly this is one of the most remarkable transportation developments of the present era.



Body side-frame unit showing truss construction. Entire units of this type are easily replaced without dismantling the rest of the body.

Versare

VERSARE



Built with the lightness and strength of a dirigible; powered for speed, pick-up and hill climbing ability under full load; with gas-electric drive of a greatly improved type, and with every inch of the interior utilized, the Versare Six-Wheel Highway Unit typifies the modern highway transportation vehicle in its most advanced form.

We shall be glad to consult with any interested railway operator with a view to adapting Versare principles and designs to his own particular operating requirements.

The Versare Corporation
Albany, N. Y.



AN INSPECTION TOUR
OF THE WELL-EQUIPPED
CAR

A double protection

KEYSTONE STEEL GEAR CASES

Protect not only your gears but also your cars with Keystone Steel Gear Cases. They are tough enough to protect the gear and pinion, yet flexible enough to bend and buckle so that the car will ride over and by an obstruction in the road—thereby preventing any chance of a serious accident.

Keystone Gear Cases are made of the highest grade of soft, open-hearth sheet steel rolled for the purpose, because of its ability to resist crystallization. These cases are formed so that the halves overlap. The halves of a given type are interchangeable. Steel parts are both riveted and spot-welded together. Due to their high quality steel and their construction, they are readily straightened when bent.



Typical Keystone
Steel Gear Case

Get full data on these as well as other Keystone Equipment found on the modern well-equipped car.

Request ESSCO Catalog No. 7.

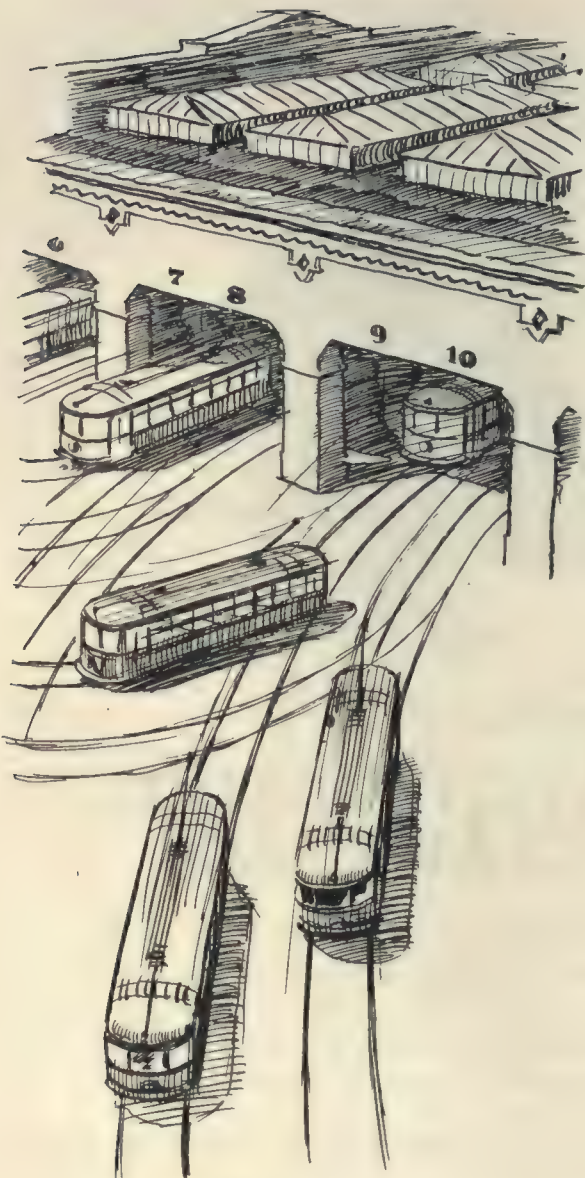
Home office and plant at 17th & Cambria Sts., PHILADELPHIA; District offices at 230 So. Clark St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

ELECTRIC SERVICE SUPPLIES Co.

MANUFACTURER OF RAILWAY POWER

AND INDUSTRIAL ELECTRICAL MATERIAL





On the regular car inspections— How about **your** wheels?

When cars are checked at the barns, does the report tell of badly worn wheels, inaccurate shafts and axles? Or does the report read—"Wheels, Axles and Springs O.K.?"

"Standard" Wheels, Axles, Shafts and Springs are made of the stuff which checks "O.K."

*Rolled
Steel
Wheels*

*Armature
Shafts*

*Axles
and
Springs*

"FOR EVERY
TYPE OF CAR



IN EVERY
TYPE OF
SERVICE"



STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

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BRANCH OFFICES:

PORTLAND
RICHMOND

SAN FRANCISCO
ST. PAUL

PITTSBURGH
MEXICO CITY

WORKS: BURNHAM, PA.



To
TREADLE-IZE
is to
MODERNIZE
and to
ECONOMIZE
but NOT to
JEOPARDIZE
the passenger

ECONOMY



WITH SAFETY

NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

General Works: Rahway, New Jersey

CHICAGO
518 McCormick Building

MANUFACTURED IN
TORONTO, CANADA, BY
Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
1010 Colonial Trust Building

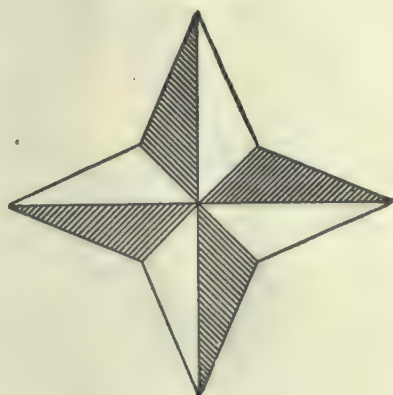
CONSTANTLY



BETTER



How does your
opinion on the
importance of
capacity with
comfort check
with established
fact?



Many street railway executives have responded to our suggestion and have compared the degree of their own appreciation with the established facts which the Cincinnati Car Company has gathered. Some of them found the need to act upon suggestions. Others found food for deep thought. None found room for argument.

When may we have the opportunity to demonstrate the relation between capacity with comfort and mounting revenue?

Comfort from journey's start to journey's end costs less in maintenance charges. It is also the sincere and practical way to say "Thank you, ride again."

CINCINNATI CAR COMPANY
Cincinnati, Ohio

CINCINNATI **BALANCED
LIGHTWEIGHT** **CARS**

—still a step ahead of the modern trend!



Your
Records!
will show!

BOYERIZED PARTS last from two to four times longer!

Boyerizing builds up a glossy, glass-hard armor coating that defies wear and laughs at friction! In actual practice this means you replace Boyerized parts *once* where you would replace ordinary steel parts from *two to four times*.

Make your selection from the list following. Then get our quotations.

BOYERIZED PARTS

Brake Pins	Spring Posts
Brake Hangers	Bolster and Transom Chafing Plates
Brake Levers	Manganese Brake Heads
Pedestal Gibs	Manganese Truck Parts
Brake Fulcrums	Bushings
Center Bearings	Bronze Bearings
Side Bearings	
Spring Post Bushings	

The
McArthur
Turnbuckle



Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

Representatives:

F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Ore.
L. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 519 Delta Building, Los Angeles, Cal.

QUALITY

EVERY *International* pole bears the stamp of approval of this company in the form of the *International* dating nail. This nail demonstrates our willingness to stand solidly behind our poles and assures the purchaser that he receives sound timber, careful manufacture, strict inspection, thorough treatment; in other words, an A-1 pole.

Long life, reliable service and the economies of Creosoted Pine lines can be obtained only in fullest measure by the exclusive use of sound pine poles free from decay, carefully seasoned and pressure treated full length with high grade creosote oil.

International poles fulfill every requirement of quality. They have been time tested by more than 28 years of service with less than 1% of renewals, and are in use from coast to coast.

Illustration shows International poles in service of the Eastern Texas Electric Co. (Stone & Webster)

International Creosoting & Construction Co.

Galveston—Texarkana—Beaumont



International

Creosoted Yellow Pine Poles

Grand Rapids' new cars - *return 35 per cent*

Thirty new G-E equipped cars have been in service in Grand Rapids since early in May, 1926.

These cars have so reduced operating expenses and increased patronage that a review of operation from June 1, 1926 to June 1, 1927 shows:

Reduction in Operating Expenses

Equipment	\$57,686.07
Power	9,379.38
Platform	43,690.45

Total	\$110,755.90
Increase in revenue	15,447.58

Total	\$126,203.48
Approximate investment	\$360,000.00
Gross return	35 per cent.



330-73

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Publishing Company, Inc.

CHARLES GORDON, Editor

Volume 71

New York, Saturday, April 7, 1928

Number 14

Telling the Intelligentsia About the Trolley

MENCKEN'S *Mercury* for April contains an article, "The Troubled Trolley," by Raymond S. Tompkins. It is a good article. The name under which it appeared was enticing, so reference was made to the back of the book where Mr. Mencken identifies his "contrihs," as Franklin P. Adams and H. I. Phillips say. Sure enough, Raymond Tompkins is none other than the assistant to the president of the United Railways & Electric Company of Baltimore. Thus do their deeds find them out. Of course, Mr. Tompkins tried to approximate the Mencken manner. And in this he succeeded, so that some of his sallies may be forgiven. Since Mr. Tompkins is himself an electric railway booster his remarks about street car Messiahs may be taken with a grain of salt. Naturally he recognizes for what they are worth some of the nostrums to which recourse has been had, but he spreads the gospel of common sense. Into the article the favorable has been packed along with the unfavorable, with a tinge of history sufficient in the way it is presented to retain the reader interest. If to some readers it would seem he is at times inclined to play ducks with those within the industry, it must not be forgotten that he plays drakes as well with the public itself. The account may be read with profit, not forgetting that the author, despite his references to the ballyhooers within the industry, is optimistic about the prospects for the restoration of the electric railway as a transportation service to full vigor and efficiency. In fact, there shines incessantly through the persiflage which Mr. Tompkins called to his aid the fact that the public is by no means ready to count out the trolley, nor are its seconds in the industry ready to toss the sponge into the ring as an admission of defeat. They have too much courage for that. And Mr. Tompkins proves it, even though he does so in a roundabout way.

The Courts Must Now Settle the Question of a 7-Cent Fare in New York

WHETHER the New York State Legislature, in its amendment to the rapid transit act in 1912, exempted the contracts authorized thereby from the general provisions of the public service law, seems to be the crux of the Interborough Rapid Transit fare case. The contention of the company is that this was not done and that the general law applying to franchises authorized by the state holds with those of the Interborough subway. In the opinion of the company, this means that the fare charged on these lines must be adequate to produce a reasonable return on a fair value of the property used in the public service, not only that owned by the company but also that owned by the city.

The fare question is now before the courts, which is the place where it apparently must be settled. If the decision is in favor of a higher fare, the city should gain equally with the company. Not only would the city profit by

receiving a return on a large investment not now earning interest, but its ability to borrow funds for further subways or other public improvements would be greatly increased. It would also gain because of the improvements which the company could make in its service. Necessary extensions of the present rapid transit system could also be financed.

Representatives of the city are opposing the company in its present application, but New York as a whole would profit quite as much as the company from a decision granting a higher fare.

Transportation That Will Sell

SUCCESS of any manufacturing business comes only when the products made will be absorbed by the ultimate consumers in volume and at a price sufficient to cover the cost and a reasonable profit. This is an economic truth that cannot be controverted. That in this respect a transportation system is no different from any manufacturing concern was brought out by E. G. Buckland, vice-president of the New York, New Haven & Hartford Railroad, in his address before the New England Street Railroad Club published in this paper last week.

Making transportation that people will buy is a complicated problem. Let there be no mistake about that. After many years of effort had not solved the problem, at least in the Massachusetts cities of Springfield and Worcester, a new method of approach was tried by the New Haven, following the restoration of the two systems to the railroad. First of all, it was necessary that the buying public should have faith in the product. This necessitated negotiations of a new kind with the public authorities. Mayors of the two cities were invited to study the problem through their representatives along with those of the railroad. The finding of these experts was that in cities of the size and character of these two, where large numbers of people had to be handled in peak hours in the densely traveled portions, no other means of transportation was so economical and so satisfactory as the street railway, properly supplemented with modern motor bus service.

With this fundamental settled the company proceeded to make an investment sufficient to produce the kind of transportation that the public wants—and that is the kind of transportation the people will buy. New cars, new track, new buses are combined with a new attitude on the part of the management and the employees, to give a brand of product with which the public has not been familiar, but which it appreciated.

Not that the New Haven was doing all this from an altruistic viewpoint. The New Haven has something to sell, apart from the local transportation in these cities. Can it be gainsaid that the vast improvement in the relations with the citizens locally will have a good effect on the general transportation situation, both freight and passenger, of the parent road? The New Haven has so

much at stake that even if it made no profit out of these local systems the good will created by the attention that has been paid to the public—its own customers—will pay handsomely in the improved outlook of the railroad itself.

It has taken a long time for the New Haven to appreciate all the possibilities in the situation. But it now has done so, and has pointed the way for other companies. There are many electric railway orphans under the control of light and power syndicates that are being carried along because they must be, and service is given half-heartedly because the franchise makes operation of some sort necessary. How much better it would be to adopt the policy of the New Haven, make the railway property stand on its own feet, and so make it return a profit, if not in cash, then in the good will it can create for the benefit of the larger system.

English Companies Admonished to Court Public Favor on Their Merits

ABOLITION of the tramways" is a cry now very rarely heard in England, even the most rabid of the anti-tramways' party having been convinced—much against their will—that tramways are here to stay, simply because they are absolutely indispensable to provide the transportation requirements of the people. Thus, says the *Electric Railway & Tramway Journal* in a recent review of the prospects for 1928. The functions of the bus have come to be better and more sensibly defined, and its adoption and use have been hastened and co-ordinated in an eminently satisfactory manner. As the English commentator sees it these are all notable gains from the standpoint of efficient public services, and their settlement enables all tramway operators to plan their future with a measure of confidence which has not existed for many years past. The results of this more healthy and better feeling are making themselves apparent on all sides. All the large tramway undertakings, and many of the smaller ones, are adding freely to their rolling stock, or are re-conditioning their old cars, being convinced by the stern logic of facts that it is only by becoming thoroughly up-to-date in that respect that they can hope to live and thrive. It is recognized that passengers want, and will have, comfort if they are to be patrons of the tramcars, hence the movement in the direction of transverse seats and close attention to upholstery. The buses give these refinements, and the cars must do likewise if they are to compete successfully.

In England, as in the United States and Canada, efforts are being made to augment the speed of the cars, and something has been accomplished in that respect, but, as the review points out, much more needs to be done by cutting out redundant stops and by adopting more efficient methods of loading and unloading before speeds can be deemed to be satisfactory. Again, as in the United States, while the movements in the directions just indicated are highly satisfactory so far as they go, there are scores of other changes and improvements which could be—and it may even be said must be—made before the tramways can be said to be doing justice to themselves and demonstrating to the full the numerous and incontestable advantages that they possess as an efficient means of public transportation. The admonitions of *ELECTRIC RAILWAY JOURNAL* are reflected by the reiteration of its British contemporary to the effect that the English companies must show that their industry is dynamic and not static, that they are out to please the public, and that they court public favor on their merits and not on sufferance.

Changing Aspects of Transportation in New Jersey

MUCH progress has been made by the Public Service Corporation of New Jersey on its program for co-ordinating railway and bus operation. The work done during 1927, which is reflected in the annual report of the company, digested elsewhere in this issue, shows the extent to which the process has been carried. During the year there was an increase of 29,822,141 passengers over the number in 1926. This was due in part to the normal increase in traffic in the rapidly growing territories served and in part to the acquisition of bus lines from independent operators, the putting of new lines into service, the extension of routes and the starting of lines giving a higher grade of service at a higher rate of fare. In all, 627,153,013 passengers were carried, 266,079,948 of them by bus compared with none so carried in 1922 and only 1,952,059 by bus in 1923. Thus is the extent of the growth of the use of the bus by the company reflected in the official figures. This makes the company the third largest in the world operating as a single unit. It is surpassed as a bus carrier only by the systems in London and Paris.

In improving the railway and bus properties \$5,973,531 was spent during 1927. This certainly is a big sum, but the Public Service is a big system and it is undergoing significant changes. On no other system in the country are the changing aspects of the industry better reflected than on this state-wide system, which includes city, suburban and interurban operations.

Hook Up to the Reader's Interests

MOST electric railway managements are now alive to the fact that the great advantage of newspaper advertising is reader interest. Unfortunately, not all of these same managements appreciate the fact that unless the messages take on the color of news they are not welcomed and are far from immediate in effect. Consequently, the very purpose for which the space was bought and paid for is defeated and in the medium which, all things being equal, should insure instantaneous attention. Opposed to this waste of words and money on the part of some railways, is the carefully poised newspaper copy of other companies which frequently effects a tie-up between the message in the advertisements and the vital interest of the community. It would appear that these companies are buying space wisely and winning customers effectively.

For example, the publication of the electric railway schedule to reach a local store on "dollar day" makes more of an appeal to the bargain hunter than statistics on railway mileage last year or last month. A picture of the comfortable seats in an interurban which runs direct to the playhouse showing Richard Barthelmess in the "Patent Leather Kid" accompanied by some teaser copy is a bigger inducement to "ride the trolley" than the economics of railway riding compared with that of competitive agencies. Similarly, an invitation to inspect new cars "today" is a more forceful selling argument than mere statements on safety, speed and economy of car riding. Not that the importance of these features in railway operation is to be minimized; but to attract the attention of the hurried newspaper reader who can afford only a very limited part of his day to the reading of news, the railway story should be tied to the reader's own interests.

An Often-Neglected Way to Reduce Costs

IN THESE days electric railway executives are exerting every effort to effect operating economies to offset decreasing revenues. Very few, however, really give consideration to the matter of fire insurance as a means of reducing their operating costs. In the matter of housekeeping alone, many thousands of dollars in insurance premiums could be saved annually without involving a large expenditure. Keeping premises clean and in order, the proper distribution of approved waste cans, fire extinguishers and sand pails, and the substitution of approved metal lockers for wooden lockers involve little expense, while the reduction in insurance rates thus effected is important.

The prevention of freezing liquids used in fire protection apparatus such as fire extinguishers, water pails and stand pipes, and the enforcement of "No Smoking" rules in car shops and carhouses, involve little, if any, expense; yet they have a direct bearing in reducing insurance rates.

The installation of properly approved sprinkler systems in carhouses and car shops probably offers the greatest saving in fire insurance premiums. In many instances, a sprinkler installation will pay for itself in from three to five years. In fact, today nearly every concern selling sprinkler systems will install complete equipment and accept in payment therefor the annual savings in insurance premiums.

As pointed out in an article in this issue by O. H. Bernd, the Des Moines City Railway, by the adoption of these principles and by carrying out a campaign among the workmen for better housekeeping, has been able to reduce its annual insurance costs \$6,315, or 44.4 per cent. Even if it were found necessary to employ a man who would devote his entire time to this one thing, and to pay him the entire saving in premiums, it would be worth while on account of the greater feeling of security and reliability of service that will be obtained. Though the anticipated fire never may happen, still the removal of potential causes goes a long way toward insuring that it cannot under any conditions disrupt the service of the road and take away much-needed revenues.

Make It Easy for the Public to Ride

REGRETS often are expressed that street railway traffic gradually is being confined to necessity riding. Certainly there is a trend in that direction. Those who bemoan the trend most loudly, however, not infrequently are the very ones who are doing least to counteract it. For one thing, efforts to encourage the casual rider to use the street car have been sadly lacking in many American cities. Far too little has been done to tell him how to use the service.

At least in the medium-sized or large cities nearly every street car carries one or more signs of some sort to tell where it is going. The signs do not always give much information. Often they are too few, they are not prominently displayed, and the lettering is too small for legibility. Inadequate illumination is provided, and all too often the signs are old and dingy. Even the largest, most legible and best illuminated ones give only meager information as to where the car is going. Admittedly it is difficult to give a full description of the route on a sign. The deficiency has been met in some places by distributing maps of the system showing just where the various routes run. This practice is widely followed in Europe. In this country one seldom sees such a system map. Abroad it is common practice to place

at prominent points in the street, signs giving the names or numbers of the car routes that pass a given locality.

All too often it is argued that signs are of use to the stranger only and that the resident of the city has virtually no use for them. It is true that they do not make much difference to the person who knows just where he wants to go and how to get there, and who already has decided to go by trolley or bus. But even the old resident, as soon as he gets off his beaten track is little better acquainted with the routing of the system than is the stranger in town. Many a person who would patronize the transportation system if he knew more about it actually uses some other vehicle, probably a taxicab. He is willing to spend a little more money rather than take the trouble to find out how he can get to his destination by street car. He is a potential rider and his patronage could be secured by a few simple efforts to sell him the service. If the non-necessity riding is to be sold, the company must do as progressive business houses do and give the purchaser a full description of the product that is for sale.

Careful Training Results in Safety

ONE is appalled to learn that during the last five years 115,000 persons have lost their lives accidentally, more than 3,000,000 have been injured and accidents are increasing about 2,000 annually. In isolated instances a week devoted to safety parades and speeches brings gratifying results, but to have more than a transient effect it is necessary to have a well-planned campaign that continues and an organization always on the alert to keep safety before the public.

In a recent United States Supreme Court decision is a constructive suggestion for future safety at grade crossings. A man, who was killed while crossing a railroad track, heard neither the train nor any other signal and took no further precaution. The court held that he did so at his own risk. To take every precaution necessary was his duty, according to the ruling, so that his own negligence caused his death. It was a "standard of conduct" the court was dealing with "and when the standard is clear it should be laid down once for all by the courts." Many avoidable accidents at crossings or in streets are directly attributable to the wanton neglect of "further precautions." Some well-informed authorities go still further and hold that there is no such thing as an unavoidable traffic accident.

In conducting an inquiry into an interurban accident some time ago a Public Service Commission made no drastic recommendations but did urge greater caution on the part of the general public and common carriers at all railroad crossings, insisting that all existing speed regulations and signals be obeyed and used.

Fortunately, accidents on interurbans and street railways are rare and not only, as some one tersely concluded on looking over the statistics, because an erring motorman "must answer to a stern boss," but also because an effort has been made to teach the motorman the ways of the motorist. In this way the human machine is developed to operate at the critical time when the careless pedestrian or motorist neglects his own safety.

In reporting the progress of its national highway safety campaign the American Road Builders Association stated that more than 200,000 persons pledged themselves to use courtesy and caution on the highways this year. Such a pledge implies mental alertness, sound reasoning and a "standard of conduct." Its slogan is short in preachment. May it be long in practice.

Detroit Survey

Develops Basic Traffic Data

An improved traffic signal system, reasonable parking restrictions, distribution of traffic, pedestrian regulation and more efficient utilization of transportation vehicles are proposed to give relief

PART ONE



Triple parking, preventing the use of three travel lanes, is a serious parking law violation. The two offenders in this case are jitneys

RECOGNITION of the need for reducing traffic hazards and the economic losses due to traffic congestion, and the possibility of making more efficient use of its streets, prompted the city of Detroit, Mich., through its Police Department, to conduct an extensive traffic survey which was recently completed under the direction of A. T. Waterfall, chairman of the Mayor's traffic committee and third deputy police commissioner. The actual work of the survey was handled by Harold M. Gould, engineer in charge. He was assisted by H. S. Simpson, traffic engineer for the Mayor's traffic committee, and an organization built up by these two engineers. The work was started in October, 1926, and the final report submitted in September, 1927.

An appropriation of \$30,000 for conducting this work was made by the Detroit Common Council upon the recommendation of Mr. Waterfall. There have been many suggestions for the improvement of traffic in Detroit, most of them mere expressions of opinion and not supported by facts. Along with these came demands for street widening, paving, and numerous

other items involving large expenditures. Extensive street improvement programs were suggested by some city officials, even though Detroit was fast approaching its bonding limits. This survey was therefore suggested as a means of studying the city's traffic problem as a whole, with a view toward the establishment of definite policies that would bring about relief. It was felt that Detroit, as the center of the automobile industry, should take the lead in the analysis and amelioration of the traffic congestion problem.

As a result of preliminary studies it was estimated that Detroit, in common with most large American cities, is less than 50 per cent efficient in the use of its streets, and that the annual economic loss due to traffic congestion

and delays is more than \$30,000,000. The report of the survey is divided into two parts, each separately submitted. The first part includes surveys of alley traffic, street parking, garage and parking lots and studies of economical vehicular speed and downtown business district traffic flow. The second part of the report includes studies of garage and parking lot

AN important purpose of the report was to collect and present basic facts regarding traffic conditions so that these data might be available for judging the effectiveness of various traffic relief measures proposed.

facilities outside of the downtown business district, night street storage of vehicles, freight and merchandise handling and transportation, cruising taxicabs and private automobiles, pedestrian control, school crossing protection, accident statistics and their use, travel habits of representative groups of the population, traffic direction and volume, trends of business and building development and a summary of suggestions made by individuals and organizations regarding improvement of the traffic situation. Numerous exhibits, charts, diagrams and tables were prepared from the data obtained. They proved valuable in showing the conditions as they actually exist and in dissipating popular fallacies regarding traffic matters.

THREE GENERAL RELIEF MEASURES PROPOSED

General measures for improving traffic movement, recommended by the report, group themselves under three headings: First, a traffic signal system that assists in producing a uniform fluid movement of vehicles and at the same time provides ample time allowance for pedestrians; second, regulations including reasonable parking restrictions, maximum use of travel lanes, distribution of traffic by the use of by-pass streets around congested centers, and pedestrian movement; third, a more efficient utilization of existing transportation agencies, including the motor car, bus and street car, through co-ordination and such measures as the express car experiment on Jefferson Avenue, operation of trucks at night, etc.

The report suggests further that merchants and truck operators make every effort to load and unload freight in alleys. It recommends the prohibition of alley parking of private automobiles and blocking of alleys by building construction. It suggests that numbers and names of business firms be provided at the alley entrances; that a strict observance of the parking provisions of the present ordinances be procured, especially during rush hours; that city departments, public utilities and other interests endeavor to arrange their field work so as to avoid partial blockade of travel lanes; that all vehicles be parked parallel to the curb, even in loading and unloading; that the present automatic signals on Cass Avenue be re-equipped as platoon-type operated signals for an extended test of this signal method, and that additional automatic signal installations be suspended until the above mentioned test has been completed.

A test of the combination express trolley car and local bus service, which is now under way on Jefferson Avenue, was recommended as a means of improving the



An example of the absolute disregard of "No Parking" signs by some motorists

speed and convenience of public transportation service, at the same time reducing traffic congestion. Other specific suggestions included in the report are that unpaved alleys serving stores and business houses be paved; that consideration be given to night illumination of alleys as a means of increasing the use thereof, both for trucks in the business districts and motor cars in the residential districts; an attempt be made to increase the use of parking lots and other off-street parking spaces; that an ordinance be enacted prohibiting street parking of vehicles between the hours of 3 a.m. and 6 a.m. to reduce thefts and accidents; that merchants study the matter of night pick-up and delivery of freight and merchandise; that space be assigned for taxicab stands, and that automatic call boxes be installed to reduce the amount of taxicab cruising. The report recommends a test to regulate pedestrian movement, including marking sidewalks into three distinct lanes in an attempt to better pedestrian traffic flow. It suggests that automatic traffic signals be installed so that pedestrians can observe them easily, and that an accident analysis committee be formed to apply actively accident prevention remedies through detailed analyses of the monthly reports of the Accident Investigation Bureau. Other recommendations are brought out in the presentation of the detailed information within the report.

One thing upon which particular stress is laid is the necessity for a determination of policy as regards the installation of automatic traffic signals, that is, whether the ultimate result is to be the aggregate of signalled intersections or a gridiron of signalled routes; the former producing frequently interrupted traffic movement on any possible route, and the latter, if progressive signals are employed, aiding in the procurement of uniform and uninterrupted traffic movement on certain important arterial routes.

MANY UNFAVORABLE CONDITIONS IN ALLEYS

Although Detroit's alley system is adequate to permit segregation of passenger-carrying and freight-carrying vehicles in the business districts, the absence of street numbers and in most cases of firm names on alley entrances of business houses, has led to their improper use for storing private automobiles, and building construction materials instead of for the loading and unloading of freight-carrying vehicles to relieve street congestion. Some buildings abutting on alleys were found to have no alley access; and some business houses used the street for freight handling because their elevators were located



Private automobiles parked in alleys for long periods obstruct the movement of commercial vehicles



Detroit has adequate off-street parking facilities, but motorists do not use them extensively

The survey of available garages and parking lots in the Loop district showed 22 garages and 106 parking lots with capacities of 5,735 and 7,660, respectively. Unused spaces averaged 6,000 each day. Three bus routes were proposed to serve the garages, parking lots, stores and buildings.

adjacent to streets. As a remedy, the report suggests an ordinance providing for placing street numbers and the names of business firms occupying the premises at alley entrances, and that business firms whose premises abut on an alley provide adequate entrances as soon as possible; that sidewalk freight elevators be moved to the alley entrances wherever such an alley is available; that alleys be kept clear of rubbish and garbage; that the blocking of alleys by building construction materials be prohibited; that merchants and truck operators load and unload freight in alleys wherever facilities are available; that when trucks are stopped for any purpose in alleys, care should be taken to avoid blockading, and that parking of private automobiles in alleys be prohibited.

The report calls attention to the need for strict enforcement of parking restrictions in the congested business district. To determine the volume and characteristics of street parking a field survey was made in 48 selected sections of the city over a period of nine hours. The field men traversing the business section every 30 minutes recorded the license numbers of all parked automobiles, whether single or double parked, whether they were parked legally or illegally, and in addition noted the location of horse-drawn vehicles. This information showed that many of the permissive parking spaces in the downtown district were occupied for periods greatly in excess of the legal time limit; also, that many automobiles were parked where parking was prohibited altogether. The maximum demand for curb parking space occurred between 1:30 and 2 o'clock in the afternoon, at which time there were recorded 4,715 vehicles parked,

whereas the permissive parking space numbered about 3,753. The influence of the one-hour parking limit was very pronounced in that out of a total of 32,450 parked vehicles recorded during the day, 25,185 were parked for one hour or less, leaving a balance of 12,265 vehicles which exceeded the one-hour limit.

Of 195,078 persons who were tallied at 27 stores during three days in November, 1926, 36,272, or 19.1 per cent, came by private automobiles. Of this number 20,393 parked their autos in the street and 15,879 in garages or parking lots. The other modes of transportation used were the motor bus or jitney, which accounted for 24.2 per cent, and the street car, which accounted for 56.7 per cent. The survey proved conclusively that storage of vehicles on business streets is not justified.

OFF-STREET PARKING FACILITIES ADEQUATE BUT NOT USED

A survey of the available garages and parking lots in the business district showed 22 garages and 106 parking lots, with capacities of 5,735 and 7,660 vehicles, respectively. The combined capacity totaled 13,395 cars. While the street parking survey showed 7,309 automobiles parked for periods in excess of one hour, the garage survey revealed that on the first day there were 5,524 spaces unused in garages and parking lots and on the second day 6,578. It is assumed that the average of 6,000 unused spaces in garages and parking lots would be ample to accommodate the 7,309 illegally curbed parked vehicles whose average storing time was approximately three hours.

Strict compliance with the traffic ordinance, it was held, would not act as a deterrent to motorists driving into the downtown business district, but would simply have the effect of changing the storage habit of those who now store their automobiles in the street.

Closely allied with the vehicular movements and parking in the downtown business district is the matter of economical vehicular movement between this district and other districts, business or residential. A study of vehicular speeds and traffic flow between the districts is



Traffic flow for twelve-hour period on the major thoroughfares

Counts were taken every day for two weeks to secure average figures and checks made at four later periods. Vehicle tallies were made also in the Loop district and the data charted.

covered in the report. An inventory was taken of the automatic traffic signals installed both within and outside of the downtown district. The data show that there were 305 locations where signals were installed, 13 from which signals had been removed and 110 for which signals had been requested. It was recommended that a fixed policy be established with respect to all signal requests, and that a study be made of each section before a signal be installed for use.

A study of four different types of signal control, namely, the isolated traffic signal, synchronous, partial platoon and full platoon or progressive system, showed that the latter type was perhaps the most desirable. Time-lane diagrams were prepared for a portion of Cass Avenue, showing vehicular movements obtained with the use of the four different types of control. The charts show a decided advantage for the progressive type from a point of speed and street capacity. The report suggested that a thorough test be made of this type of control and if found as satisfactory as anticipated that other installations be made.

Rush-hour traffic should be given special preference by keeping open for moving vehicles the full width of the pavement in the direction of greatest traffic movement. Although this is provided for by ordinance in Detroit it is not satisfactorily observed. Another disturbing factor is the obstruction of traffic by slow-moving vehicles.

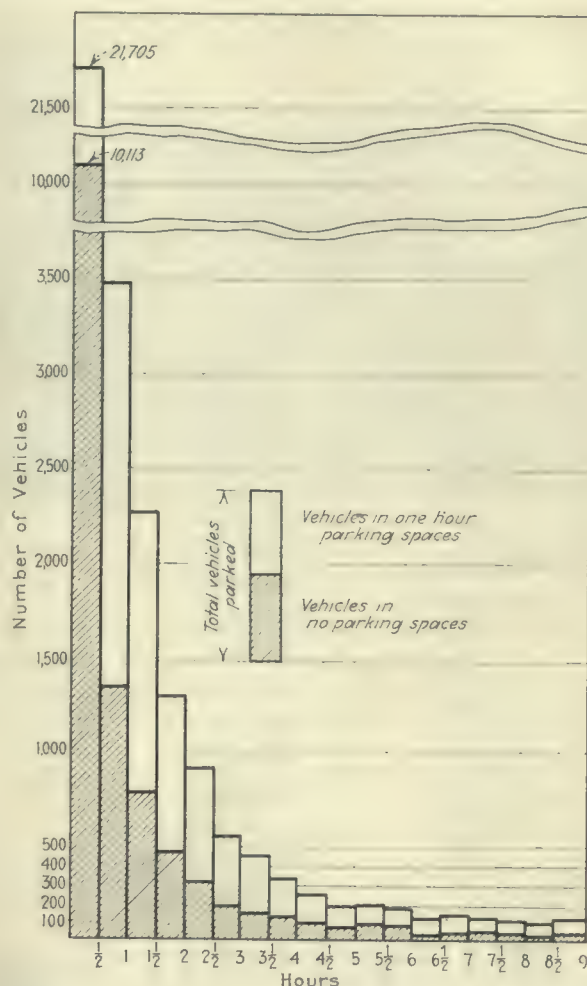
Street cars using the natural highest speed lane and operating on a local stop service become low speed vehicles, and in view of the ordinance requiring other vehicles to stop with them, have a very definite retarding action on all other vehicular movements, according to the report. A speed of between 15 and 25 m.p.h. is said to be the most efficient for the flow of vehicles along a thoroughfare. Tests made on several Detroit streets showed that the average speeds were considerably lower than they should have been.

It was suggested in the report that a plan of operating street cars express with supplementary buses to give local service be tried on some route in the city. This is being done on Jefferson Avenue as described in the Jan. 7, 1928, issue of ELECTRIC RAILWAY JOURNAL. Such a combined service was expected to expedite materially the flow of all types of vehicular traffic on any street where trolley cars are operated.

TRAFFIC FLOW DATA IN LOOP DISTRICT OBTAINED

A vehicular traffic flow map shows the volume of travel on the various streets within the downtown business district. It is intended to use this map and other traffic flow data in planning the further installation of automatic traffic signals.

The following suggestions were made with respect to traffic signals and vehicular speed: That the present automatic signals on Cass Avenue be re-equipped as progressive-type operated signals for tests, preparatory to the general adoption of this type of control; that the installation of additional automatic signals be postponed until the above mentioned test has been completed and only after field tallies and analyses show that the proposed signals meet the conditions of controlled routes, rather than controlled isolated locations; and that a reduction be made



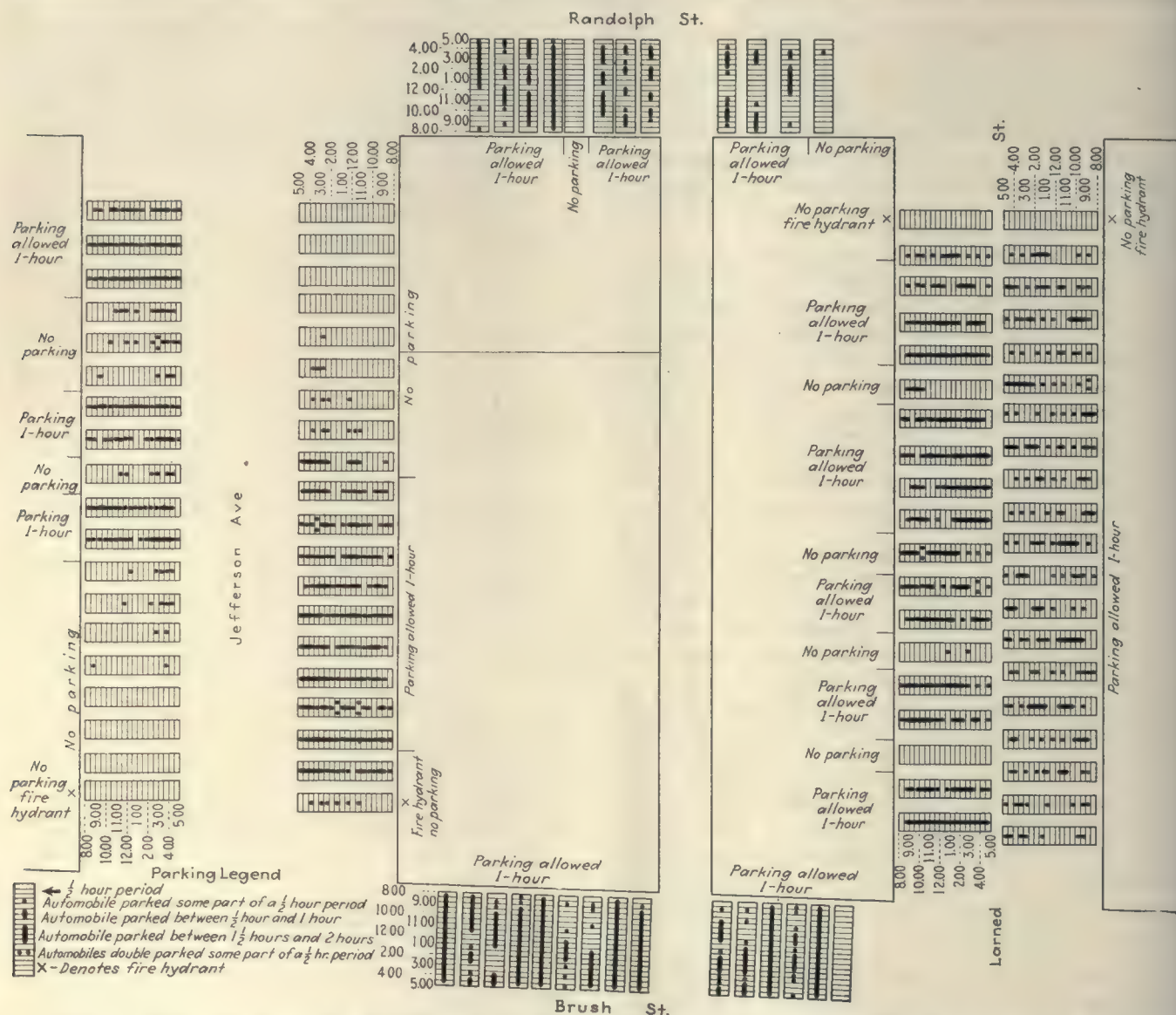
This chart shows the length of time vehicles park in the "No Parking" and "One-Hour Parking" spaces of the Loop district

in the number of stops of all vehicles, particularly street cars. In the sections outside of the downtown business district, surveys were made of garages and parking lot facilities, night street storage of vehicles, freight and merchandise handling and transportation, cruising taxicabs and private automobiles, pedestrian control, school crossing protection, accident statistics and their use, public transportation agencies, traffic direction and volume and development of outlying business centers.

Even outside the central business district, unrestricted parking was found to limit seriously the number and capacity of movement lanes. An extensive survey of garages and parking lots available showed a marked deficiency in the number needed. It was suggested that this deficiency could be met in part by the use of rear lots, vacant lots and the space between the curb and sidewalk.

Expenditures need not be made for street widening unless there is a legitimate demand for space for moving vehicles that cannot be met by existing facilities. It was suggested that private companies provide parking spaces wherever possible; that merchants of a neighborhood use collectively a near-by vacant lot; that the space between the curb and the sidewalk be used; that automobile parking be prohibited on certain thoroughfares dur-

It has been estimated that Detroit, in common with most large American cities, is less than 50 per cent efficient in the use of its streets, and that the annual economic loss due to traffic congestion and delays is more than \$30,000,000.



The volume of street parking and the turnover thereof in the central business district was surveyed and the data for 48 sections charted as above. Each chart shows by half-hour periods how long vehicles were parked, vehicles parked double and those occupying "No Parking" spaces

ing certain periods of the day, and that alleys outside the business district be paved and illuminated. A chart was prepared to point out the possibilities of the use of parking lots just outside of the downtown business district to take the overflow of cars which at any time cannot be accommodated properly within the district.

Night street storage in Detroit has become a big problem in face of the increasing number of motor vehicles and the several serious drawbacks to this mode of storage. Where the number of cars owned per block is in excess of the off-street storage facilities, street parking occurs. A survey was made in twelve representative districts to determine the number of alley garage spaces, divided into vacant and rented; the average monthly rental therefor; the capacity and average amount of vacant space in public garages, and the number of night

parked vehicles block by block. The survey shows that the amount of vacant garage space is inadequate to house the vehicles which the records show were stored in the street. This condition is particularly true in districts where apartment houses predominate. On the other hand, many of the garages were nowhere near filled and the conclusion was reached that garages will not be used to capacity while free street storage is so easily procured. High rates and inaccessibility of garages are contributing causes to night street storage.

The presence of unguarded vehicles in the streets during the night is a temptation for theft. A majority of thefts occur between midnight and 6 a.m.

The movement of commercial vehicles, the control of pedestrian traffic, and the modes of travel used by 101,541 persons in reaching their homes from eleven employment districts will be discussed next week.

Of especial interest to public transportation operators!

A map showing the travel habits of 101,541 persons in Detroit will be presented in Part II of this article.

Don't fail to read it!

Gas-Electric Cars Cut Railroad Costs

Fuel and crew costs are reduced on branch lines of steam railroads by substituting gas-electric equipment

By W. R. STINEMETZ

Assistant to Transportation Sales Manager
Westinghouse Electric & Manufacturing Company

GAS-ELECTRIC cars, because of their low operating costs, are useful for the light and infrequent traffic of branch line service of railroads. Their use also stimulates traffic by providing the traveler more attractive accommodations than those of obsolete rolling stock usually assigned to steam branch line service.

To show how much a gas-electric car can save a railroad, a typical example of an average month's operation of a motor car and trailer actually substituted for a branch line steam train will be given. The steam equipment consisted of a locomotive and tender, a combination baggage car and smoker, and a passenger coach. The gas-electric train consisted of a combination baggage-smoker motor car and a passenger-trailer coach. The trains had the same space accommodations but the steam train with its locomotive and tender totaled more ton-miles. One round trip was made per day over the 40-mile line for 30 days, with the results given in Table I.

The gas-electric system shows a net saving of \$1,568 per month or \$18,816 per year, largely accounted for in three items—fuel, crew wages and repairs. This amount represents about 31 per cent of the investment for the gas car and trailer, allowing no salvage value for the steam train equipment replaced.

ELIMINATING BRAKEMAN EFFECTS FURTHER SAVINGS

Further savings have been effected on other roads by arranging the two-car train so all passengers enter or leave by one platform, and eliminating the brakeman from the train crew. One road using the system is handling the same amount of traffic as with the old four-car steam trains, and with passengers better satisfied. The average cost to run the steam trains was \$1.08 per train-mile whereas the motor train gave the same service for a



A 60-ft., 250-hp. electric car of the Philadelphia & Reading Railroad at the Trenton, N. J., station

year at a cost of 38 cents per train-mile. On the foregoing basis, one of these train units costing \$60,000 gross would show, with a daily service of 100 train-miles, a saving of \$25,550 per year, or 43 per cent on the gross investment.

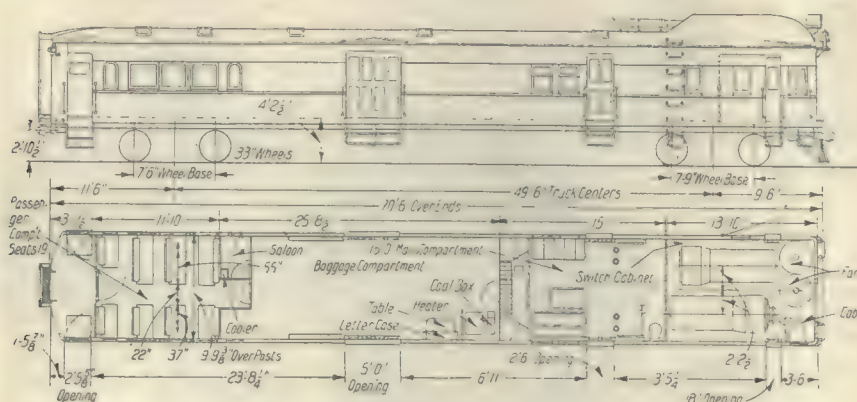
When traffic is too heavy for single power units and trailers it is entirely feasible to use multiple-unit gas-electric car trains in a manner similar to multiple-unit car operation on an electrified line. The savings which could be expected with multiple-unit gas car operation under more congested conditions are shown in the following

TABLE I—30-DAY EXPENSE RECORD OF GAS-ELECTRIC AND STEAM TRAIN OPERATIONS

	Gas-Electric	Steam
Fuel (coal or gasoline).....	\$338.20	\$603.00
Lubricants.....	17.11	35.00
Water.....		10.00
Cleaning cars or engine.....	56.52	35.00
Supplies.....	6.86	35.00
Engineers' wages.....	297.72	297.72
Conductors' wages.....	288.56	288.56
Trainmen's wages.....	214.54	453.46
Firemen's wages.....		220.30
Engine house expense.....	46.87	101.00
Running repairs.....	210.36	966.00
Totals.....	\$1,476.74	\$3,045.04
Average cost per passenger-mile, cents.....	1.21	2.49
Average cost per train-mile, cents.....	59.80	123.00



A typical 73-ft., 250-hp. Brill-Westinghouse gas-electric car of the Boston & Maine Railroad



Elevation and floor plan of Lehigh Valley car arranged to handle passengers, baggage and mail

TABLE II—ANNUAL OPERATING EXPENSES FOR STEAM AND GAS-ELECTRIC OPERATION

	Steam Operation— Cents per Train-Mile	Operation— Total Cost per Year	Gas-Electric Operation Cents per Train-Mile	Total Cost per Year
Crew expense.....	38.58	\$282,720	31.460	\$230,557
Fuel (coal or gasoline).....	23.90	175,113	19.090	139,879
Locomotive repairs (motor car).....	29.70	217,610	6.036	44,227
Locomotive supplies (oil).....	1.70	12,359	1.794	13,151
Engine house expense.....	7.70	56,419	2.414	17,692
Train supplies and car expense	8.00	58,616	2.753	20,172
Totals.....	109.58	\$802,837	63.547	\$465,658
Cost of yard switching and facilities.....		55,900		18,650
Total main line and yard....		\$858,737		\$484,308

comparison. The 190-mile division considered joins a large city terminal and a moderate-sized city. In addition to several through trains daily the large city terminal handles ten local passenger trains in each direction, in the suburban zone of 40 miles. The smaller city also has a suburban zone of 40 miles, and requires four trains in each direction daily. To handle the service with steam requires six Pacific-type passenger locomotives, sixteen passenger locomotives for local service and 75 passenger and express cars, with a total salvage value of \$275,000.

To maintain the same schedules with complete new gas-electric motor cars and revamped steam trailers and provide express and passenger service would require 37 motor cars at \$39,500 each and 37 revamped trailers at \$2,500 each, a total cost of \$1,554,000. Allowing a salvage value of \$238,000 for the locomotives and 38 cars the net investment would be \$1,316,000.

ANNUAL EXPENSES CONSIDERABLY LOWER FOR GAS-ELECTRIC EQUIPMENT

The annual operating expenses of the equipment, based on reliable data, are given in Table II. Here again the principal savings are in crew expense, fuel and maintenance. The standby fuel losses are eliminated and the gas car consumes fuel only when doing actual work. The large maintenance saving is due to the age of the steam locomotives as compared with the new gas-electric

TABLE III—COMPARATIVE DATA SHOWING SAVING OF GAS-ELECTRIC OPERATION OVER STEAM OPERATION

	Steam	Gas-Electric
Net investment.....		\$1,316,000
Annual operating expense.....	\$858,737	484,308
Fixed charges*.....	132,217	170,477
Total operating expenses.....	990,954	654,785
Saving over steam operation.....		336,169
Per cent saving on net investment.....		25.6
Per cent saving without fixed charges.....		28.5

*Include interest, insurance, taxes and depreciation.

equipment. This factor, however, is balanced by the higher fixed charges incurred by the net investment for the new equipment. In Table III comparative data are given showing the saving of gas-electric operation over steam operation. Using the figure of \$1,316,000 for the net investment of gas-electric equipment, the fixed charges, including interest, insurance, taxes and depreciation total \$170,477. This figure added to the annual operating expense of \$484,308, indicated in Table II, gives a total annual cost of \$654,785. The corresponding figure for steam is \$990,954, so that a saving of \$336,169, or 25.6 per cent of the net

investment, is shown for gas-electric operation over steam.

The heavy electric traction committee of the American Electric Railway Engineering Association has as one of its subjects for investigation, "Branch line electrification, and self-propelled cars and locomotives." This committee has presented much valuable data on the operation of gas-electric cars, particularly in the reports of 1925, 1926 and 1927.

Snow Costs Depend on Kind of Snow

DESPITE the popular belief that the lack of snow is a big help to the financial affairs of a street railway, the Worcester Consolidated Street Railway, Worcester, Mass., has produced figures which lend an interesting light to the situation, revealing that it is not a question of how much snow but what kind of snow.

Costs of snow removal for five years cannot be taken for a barometer of the snowfall, it was found. Some months when there is little or no snow, the snow costs are heavy due to frozen switches, and that dreaded succession of snow, rain and freezing weather.

In December, 1927, which was considered a very open month, the cost of snow removal for the Worcester system was \$3,056, less than one-third of the cost for the year before, which was \$11,794, but nearly twice as much as for 1925, which was \$1,893.

Last year February's snow removal cost was \$8,058 and in March \$4,098. In 1926 the February cost was \$31,235 and March \$5,835. In 1925, March was more like a lamb, costing only \$343, but February snow cost \$8,579. Only once in the three preceding years did the figure for either month fall below \$5,000.

Electrification Reduces Smoke Pollution

SMOKE damage to the Chicago Art Institute has been measurably reduced, according to a statement by the superintendent of the Institute, since the electrification of the Illinois Central Railroad suburban service. The through trains are still steam-driven. Approximately 4 tons of soot were taken from the building's roof during 1927, whereas during the previous year 13 tons were removed. The smoke and cinders falling on the roof of the building and seeping inside deface costly paintings, statues and fabrics, and the thin coating which forms on everything results in disintegration. The reduction of smoke pollution is of great value to the Art Institute.



Ventnor Heights bus at Albany and Atlantic Avenues, where connection is made with the street cars

Feeder Bus Service Stimulates Riding

Operation of three routes in recently developed residential districts has brought Atlantic City & Shore Railroad a substantial volume of new business

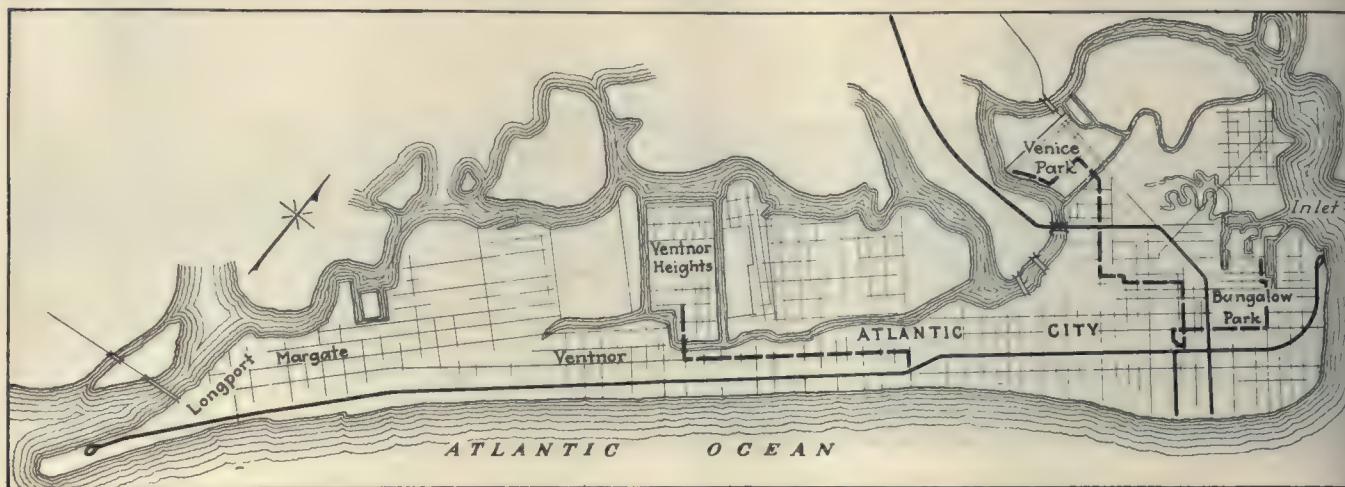
FEEDER bus service established last summer by the Atlantic City & Shore Railroad, Atlantic City, N. J., has proved a valuable adjunct to the rail lines. Two of the three bus routes operated by this company serve newly-developed residential districts, while the third is partly a replacement of a former car line and partly an extension into new territory.

The geographical arrangement of Atlantic City is

unique, lying, as it does, on a narrow strip of sand between the Atlantic Ocean and extensive salt marshes. The railway operates two principal car lines. One is an interurban called the "Shore Fast Line" which starts at the Boardwalk in Atlantic City, crosses the marshes to the mainland and continues thence to Ocean City. The local car route is somewhat L-shaped, about 8 miles long, extending from Absecon Inlet on the north via Maine



Terminal of the Venice Park and Bungalow Park bus routes opposite the Pennsylvania Railroad Station



Three bus routes operated by the Atlantic City & Shore Railroad supplement the local trolley service

and Atlantic Avenues to Longport on the south. The center of the business district of the city is about $1\frac{1}{2}$ miles from the northern end of this car line.

Throughout the greater part of its length the city is so narrow that the car line on Atlantic Avenue is within easy walking distance. At its northern end, however, the width is somewhat greater. The short leg of the L of the car line serves a portion of this district, and another car line on South Carolina Avenue formerly served another portion of the territory lying west of Atlantic Avenue. It is this second car line that has been replaced by a bus line, except for a short section between Atlantic Avenue and the Boardwalk, where a shuttle car is operated. The bus line starts in front of the Pennsylvania Railroad Station, west of Atlantic Avenue. A second bus line starting from the same point serves an adjacent district which has been newly developed. These routes are called Venice Park and Bungalow Park. The third bus route, Ventnor Heights, is located some distance away. This connects the new suburban district of that name with the car line at Atlantic and Albany Avenues.

The Venice Park bus route, the most important of the three, began running in May, 1927. In February, 1928, approximately 750 passengers per day were being carried. The route is 2.2 miles long and the running time is thirteen minutes. The schedule speed is 10.2 m.p.h. A total of 167 bus-miles per day are operated on this route.

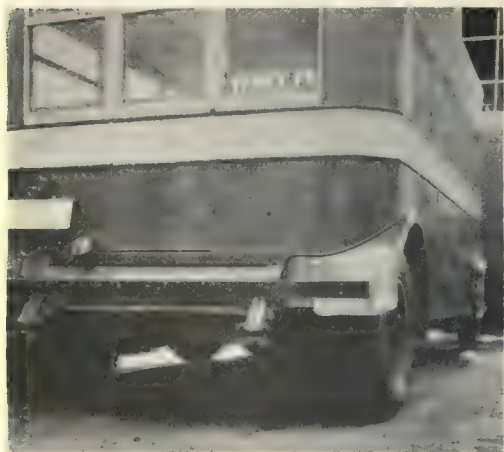
The Bungalow Park bus route, which serves an ad-



Passengers alighting from an inbound bus at North Carolina and Atlantic Avenues

jacent neighborhood, was started at the same time. Its length is 1.3 miles and the running time nine minutes. Schedule speed is 8.65 m.p.h. About 280 passengers per day are carried on this route and the buses operate 88 miles.

The Ventnor Heights bus route was established in September, 1927. At the present time 240 passengers per day are being carried and the buses operate 126 miles. This route is 1.75 miles in length. The running time is eleven minutes and the schedule speed 9.55 m.p.h.



At left—A small sign in the rear window makes it easier for the passenger to determine on what route the bus is operating.
At right—When not in service buses are stored in an unused bay in the carhouse

Operations are conducted under the name of the Central Transportation Company. This was derived from the name Central Passenger Railway, an underlying company. Fares on the buses are 10 cents with free transfer to the cars. The car fare is 7 cents and a 3-cent charge is made for transfer to the buses. The revenue per bus-mile averages about 30 cents, while the cost of operation is slightly over 33 cents per bus-mile. It is expected that the revenue will increase as the districts served build up. While these buses act principally as feeders to the rail line, they have actually developed traffic that did not previously exist.

The company has a total of seven buses. Of these, six are 21-passenger Yellow model X buses and one is a 29-passenger Yellow model Z. In addition to the standard equipment of roll signs in front, each bus carries a small route sign in the rear window. This has proved particularly useful because the Venice Park and Bungalow Park lines have their terminal west of Atlantic Avenue in such a location that most of the passengers approach from the rear. The rear sign makes it possible for an approaching passenger to tell whether it is his bus or another which is standing at the terminal.

The buses are housed in one bay of the company's car-house. Maintenance and inspection work is done in the railway shops. For this purpose the buses are run over the pits in the same way as a car. The work is not done by the regular shop men, however, but by a special group of bus mechanics. When in service buses are operated by former car operators.

Light Interurban Has Good Record

ONE of the first light-weight interurbans to be placed in service anywhere is car 103 of the Princeton Power Company, operating the interurban connecting Princeton, W. Va., Bluefield, W. Va., and Graham, Va. The car, which has been operated continuously since 1917, is still in excellent condition and should remain in service for many years more, according to S. J. Evans,



Light-weight interurban car of the Princeton Power Company which has operated continuously since 1917

president and general manager of the company. It has proved most satisfactory to operators and patrons alike. Its low energy consumption, averaging 0.8 kw. per car-mile, has effected a great saving. Its high rate of speed, 40 m.p.h., is especially appreciated by the patrons.

The car is a 41-passenger combination unit with smoking compartment. It was built by the Cincinnati Car Company, is all-steel, weighs 21,000 lb., and is equipped with Westinghouse No. 506 motors mounted on 26-in. steel wheels.

London Underground Uses Ticket-Issuing Machines

In spite of its zone fares the London Underground has been successful in employing automatic machinery in its fare collection

MECHANISM which is largely automatic is used in a system of fare collection which has been developed on the London Underground System, although zone fares are charged. Originally, on this system, tickets were sold at ticket windows, as on steam railroads. They were printed with the names of the initial and final station and were surrendered by passengers as they left the destination station. This acted as a safeguard against overriding.

The next step, introduced some twenty years ago, was the installation of slot machines for the sale of tickets. Not all tickets were sold by machine, only the denominations most commonly used, as 2-penny and 2½-penny tickets. The others were sold from a window (or booking office as it is called in London). The machines relieved the ticket agents, however, of considerable work and also helped the public by shortening the time of waiting to buy a ticket. Lettering on the machine showed clearly the amount of money which had to be deposited to secure a ticket and the station or stations to which such a ticket would entitle a passenger to ride. Such a slot machine is shown in an accompanying illustration.

These machines, while useful, were of rather primitive design and noisy in operation. In their original form they also were open to fraud by the use of slugs. They served the purpose, however, and many of them, although greatly improved, are still in use. They still require the exact amount of money to be inserted. They do not make change.

The latest type of slot machine in use on the London Underground System will take either the exact fare or will make change if the traveler inserts a 6-penny coin or a shilling coin. It also weighs the coin inserted and tests it electrically for conductivity to determine whether it is spurious, or not. It then prints, dates and issues a ticket instead of taking one from a supply. All this is done at the rate of a ticket a second. There is only one money slot, no matter what the coin or coins that are dropped into it.

It is believed that this type of machine, when generally installed, will greatly increase the use of slot ticket machines, as experience has shown that 90 per cent of all the passengers at the Underground ticket offices are in possession of either copper penny pieces for the fare, or sixpences, or one shilling pieces.

The type of slot machine just mentioned is not the only one being tested out by the London Underground. Three other forms are also in use. One, shown in Fig. 4, is purely mechanical and has the advantage that it occupies less space than that shown in Fig. 3, though it does not make change. Another advantage possessed by a purely mechanical machine is that it can easily be moved from one station to another. Hence, it is especially convenient for use at outlying stations on days when they are to be used by a large number of people, as for a Rugby game or other athletic event.

Fig. 5 shows how five of these machines designed for different rates of fare have been brought together at one station to occupy a circular space only 3 ft. in diam-

eter. Fig. 6 shows another form of this machine. It is designed to be tall so as to take up very little floor space. It is especially useful in passageways where the room is limited.

Besides these ticket-issuing machines, the company is testing out turnstiles, or passimeters, on rather an extensive scale. These machines have to differ from those used in the United States, because in addition to registering the fare they have to issue a ticket showing the destination to which the fare is paid.

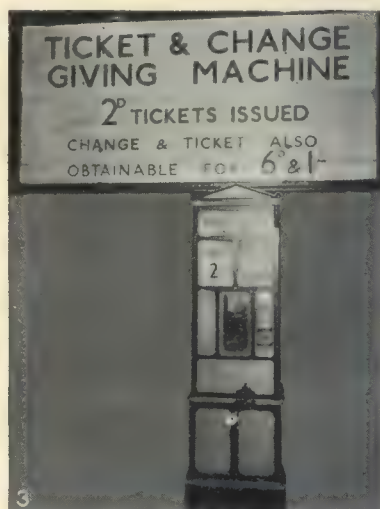
One of the latest turnstile designs is illustrated in Fig. 7. If the passenger drops two pennies in the slot of the 2-penny passimeter, he will receive his ticket printed and dated. At the same time the turnstile is automatically released, thus providing admission to the train platform. If a 6-penny or a shilling coin should be dropped in the slot the same procedure is followed except that the passenger also receives his proper change.

Still another form of passimeter station is shown in Fig. 8. Here, as the passengers pass through the station, pay for and receive their tickets, they are registered on meters in the ticket office. With this system, as well as with the passimeter illustrated in Fig. 7, the inspection of tickets, which has to be done with all the other plans, is dispensed with except for holders of season tickets and return tickets. These represent only about 20 per cent of the traffic.

The latest office ticket issuing machine in use on the

London Underground is shown in the final engraving, Fig. 9. This machine, which is also used with a passimeter, prints, dates and numbers the ticket from plain rolls of paper, and has a capacity of four tickets per second. It is primarily intended for the issue of tickets of the less common denominations, i.e., tickets which have to be issued from an office.

The clerical staff much prefers this machine to the former plan where tickets had to be taken out of the case one at a time. In fact, the work is so much easier that it has been found practicable on the deep underground lines to locate the electrical switches which control the elevators to the station platforms in the ticket office.



Old and new ticket-selling and fare collection methods on the London Underground railway system

1. The earliest method used in London, where tickets were sold at a window and punched at a barrier.
2. First ticket-issuing machine.
3. This machine issues 2-penny tickets and gives change for larger coins.
4. This double machine issues 1-penny

- or 2-penny tickets and is mechanically operated. It does not make change.
5. Several automatic machines grouped in the form of a kiosk.
6. A high design with small floor area for narrow passageways.
7. The passimeter and change-making

- machine which dispenses with both ticket seller and ticket puncher at entering stations.
8. Through type of passimeter station.
9. Ticket printing and issuing machine for office issue, used in conjunction with passimeter.

Pontiac, Mich., Improves Its Principal Street

Extensive program involves widening and repaving of Saginaw Street and the relocation and rebuilding of $1\frac{1}{2}$ miles of double track



Street car service was uninterrupted during the construction. One track was poured at a time and operation continued on the other track

INCREASING traffic needs caused the city of Pontiac, Mich., to adopt an extensive program of street widening and opening, the major part of which was the widening and rebuilding of Saginaw Street, the principal business thoroughfare and a continuation of Woodward Avenue of Detroit. The improvement, described in an article in *Engineering News-Record*, involved not only the repaving and the complete rebuilding of $1\frac{1}{2}$ miles of main thoroughfare, but also the removal, relocation, rebuilding and repaving of more than $1\frac{1}{2}$ miles of double-track street railway.

In the rebuilding of the street the Detroit United Railway, which operates both the local transportation system and the interurban service to the city of Detroit, completely rebuilt its double-track line. The condition of the rails and ties did not warrant their use in the type of new construction demanded by the city. On about 2,000 ft. of street in the business section there existed three tracks, all of which were in poor condition. The plans for rebuilding eliminated one track and called for a new double track in the center of the street. This rebuilding

of the street railway system is the more interesting since the franchise for the Saginaw Street line expired on May 17, 1927, and on May 24 a day-to-day agreement was entered into, whereby the street railway company agreed to a number of things, chief of which was the rebuilding of its tracks under city specifications, supervision and inspection.

PLANS PREPARED IN CITY ENGINEER'S OFFICE

All plans and specifications for the new construction, with the exception of special-work layouts, were prepared under the direction of the city engineer and approved by the street railway, of which J. M. Mudie is chief engineer. G. J. Wagner & Company, consulting engineers, of Grand Rapids, Mich., retained as consultants on transportation matters, acted in an advisory capacity on plans and specifications and helped supervise construction of the tracks.

The trackwork consists of 6-in. 100-lb., A.R.A.(A) rails, with thermit-welded joints. The ties are sawed white oak, 6x8 in., 6 ft. 8 in. long, 2 ft. c. to c. and cased



Safety zones and platforms were installed at all important street railway stops in the business district

in a monolithic mass of concrete extending from 8 in. below the ties to 1 in. above them. The paving consists of 4-in. wire-cut paving brick laid on a 1-in. sand cushion and having the joints poured with asphalt filler. Rail filler was used with all regular T-rail sections, together with a special brick nose-block. The concrete was designed for a minimum strength of 2,500 lb. per sq.in. at the end of fourteen days. Actually the test cylinders averaged 2,788 lb. at that time. A carefully proportioned aggregate was used, consisting of a 1 : 3 : 4½ mix, with the mixing time not less than two minutes. The concrete was placed as dry as possible consistent with workability.

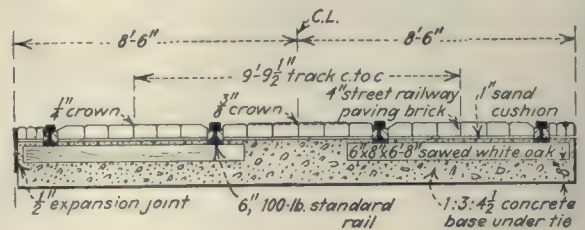
In construction, one track was poured at a time and car service was given over the other until the concrete had attained the desired strength. This required not more than fourteen days, as shown by compression test cylinders. In a few instances, where it was impossible to discontinue service, each tie was well blocked and concrete of a richer mix and longer mixing time poured to within 1 in. of the bottom of the ties. When this had attained sufficient strength the track was relined and reblocked with shims resting on the concrete and the remainder of the concrete was poured. Where this method

was used, the base concrete attained a strength of 2,500 lb. after four days and showed no sign of disturbance from the uninterrupted service.

For the 120-ft. right-of-way an 80-ft. pavement was designed, with a 20-ft. sidewalk on each side. This provides for the double-track street car line, four 10-ft. lanes for moving traffic and two 10-ft. lanes for parallel parking. The wide parking space was provided for two reasons: If parking is prohibited during rush hours, the street will accommodate eight lanes of moving traffic; and the wide parking space will allow greater ease and safety in parking, with less inconvenience to moving traffic.

PAVEMENT CONSTRUCTED TO WITHSTAND HEAVY TRAFFIC

The pavement base, of 1 : 3 : 4½ concrete, is 11 in. thick, reinforced by ⅝-in. rods spaced 2 ft. c. to c. longitudinally and ½-in. rods 3 ft. c. to c. laid crosswise. Adjoining the street railway section, the base is thickened to 14 in., which decreases to the regular thickness in a distance of 3 ft. from that section. A 3-in. straight paving



The ties are cased in a monolithic mass of concrete. Four-inch paving bricks are laid on a 1-in. sand cushion

guard doweled to the base forms a division between the asphalt surface and the street railway brick paving. That paving is completely separated from the street pavement by a ½-in. expansion joint extending from the surface to the subgrade.

During the rebuilding of the street the interests of the merchants and business men were held of paramount importance.

All underground work was carried on without closing the street, and the work was confined to limited areas until finished. All back-filling from excavations was mechanically tamped in thin layers. In some instances additional dirt had to be supplied to fill the trench completely, showing that a compaction had been secured greater than that of the original soil. By keeping the various activities spread apart no portion of the street was closed for any great length of time, although it was necessary to barricade the same area more than once. The various operations, involving excavation, curb and gutter, concrete base and asphalt surface, followed in quick succession.

Traffic is so heavy and constant that safety zones with platforms were installed at all



The Saginaw Street improvement included the complete reconstruction of 1½ miles of double track

important street railway stops in the downtown district. These zones, one of which is illustrated, are of the raised concrete type, having a protective curb and iron railing with a splash apron and caution light at the end of each zone. All important street crossings are protected by stop lights, the timing of which is progressive. In addition to the lights, the crossings have galvanized metal markers, and it is hoped that these, in conjunction with the lights, will discourage jay-walking and minimize traffic accidents.

An interesting feature of this $1\frac{1}{2}$ miles of street rebuilding is that the only poles will be combined light and trolley-span support poles 120 ft. apart. These poles are of fluted steel with old-bronze lacquered finish and are 23 ft. high. Each pole carries an ornamental cross-bracket supporting two 600-cp. lamps. Before adopting this pole exhaustive tests were made at the manufacturing plant, which showed that it corresponded in deflection to a 6-7-8 in. tubular steel pole weighing 887 lb., except that the safe load on the fluted pole was 3,500 lb., as against 1,544 lb. for the tubular pole. Under a load of 2,000 lb. the deflection was only $5\frac{1}{4}$ in.; at 4,000 lb. it was $11\frac{1}{8}$ in. and upon removal of the load the pole returned to within $\frac{3}{8}$ in. of its original position. The vibration tests also were satisfactory.

Des Moines Reduces Fire Insurance Cost 44.4 Per Cent

By O. H. BERND

Secretary the Des Moines City Railway, Des Moines, Iowa, and Member Insurance Committee American Electric Railway Association

SINCE Nov. 13, 1923, the Des Moines City Railway has reduced its insurance costs \$6,315 per year, or 44.39 per cent. In other words, the average rate has been reduced from 47.3 cents per \$100 to 26.3 cents per \$100 of insurance.

Early in January, 1924, the insurance was placed on a three-year term, at $2\frac{1}{2}$ times the annual premium, effecting a saving of approximately \$2,300 per year.

The company then directed its efforts to the matter of housekeeping. All of the recommendations made by the local insurance rating bureau, in co-operation with its affiliated organizations, which did not involve any considerable expenditures, were carried out. All wooden lockers for workmen were replaced by approved steel lockers equipped with slanting tops to prevent the storage of any articles on top. Old waste cans were replaced with new approved types and properly distributed throughout the shops and carhouses. Additional fire extinguishers and sand pails were placed in accord with bureau recommendations. All dead or abandoned electric wiring was removed from the various carhouses. In addition to these physical improvements, the program included a general campaign among workmen to induce them to keep their work places clean and free from accumulations of rags and rubbish, resulting in a marked improvement in the performance of their work.

The company has recently completed the installation of automatic sprinkler systems in its car shops and one of its two carhouses. The second carhouse is a temporary frame building, and does not warrant the expenditure necessary to equip it with a sprinkler system.

These automatic sprinkler systems were installed at an approximate cost of \$16,900. As an offset to this ex-

penditure, there was received by the company in return premiums, on account of the reduction in rates, the sum of \$8,484, so that the actual cash outlay for these sprinklers was less than \$8,500.

The total annual insurance saving effected by them is \$3,636. The largest saving is in the car shop. This is a one and two-story brick and concrete building with composition roof, erected in 1904 and partially rebuilt following a fire in 1912. Before the installation of sprinklers the average rate for this building and contents, except rolling stock, was \$1.291 per \$100, while the present rate is 22.4 cents per \$100 of insurance, effecting an annual saving of approximately \$2,668.

The carhouse, which was equipped with automatic sprinklers, is of brick with composition roof, and has a storage capacity of 45 passenger cars. While the average rate on this building and contents, except rolling stock, was reduced on account of the sprinkler installation from 76.4 cents to 28.3 cents per \$100 of insurance, the annual saving effected is but \$230, as only \$48,000 insurance is carried on the building and contents, except rolling stock.

The sprinkler installation in the car shops and carhouse resulted in an insurance saving on the company's rolling stock of \$747, or approximately 10 per cent—a substantial saving, when it is considered that the combined storage capacity of both car shops and carhouse is but 53 passenger cars, or less than one-third of the company's rolling stock.

In addition to the direct savings on insurance premiums we consider the sprinklers a good investment because of the protection they afford, as a serious fire in a carhouse or shops might easily result in crippling the service and prove more costly than the sprinkler installation.

School for Arc Welders

FOR MANY years a school of welding has been conducted in the shop of the Lincoln Electric Company, Cleveland, Ohio, but just recently it has been reorganized and re-equipped. No tuition or fees are charged. The equipment includes a number of standard 200 amp. Stable-Arc welders installed in line with a series of booths in which the pupils work. All wiring except the necessary leads to the electrode holders are in conduit and the floor space is kept clear. The individual compartments are curtained by heavy material.

A 30-day course is given in twelve lessons which include the following: (1) The contact of the arc, its characteristics and manipulation; (2) the nature of welding rods and depositing materials; (3) the operation and care of the welding machine; (4) the nature of vertical and overhead welding; (5) testing welds for porosity and strength; (6) welds on cast iron and their percentage of strength; (7) the advantages and future of carbon arc welding; (8) welding of copper and bronze castings; (9) the use and abuse of pressure welding; (10) the assistance to the human element in Stable-Arc welding rods; (11) the construction of welded machine tools; (12) the simplicity and strength of welded fixtures.

Pupils work under the direction of a trained inspector who teaches them both as a class and as individuals. With 30 days intensive training men are able to acquire a sound working knowledge of the fundamentals of electric arc welding, and are fitted to engage competently in the trade.

Pacific Electric Has Balanced Educational Program

Los Angeles Board of Education furnishes paid instructors for the classes. More than 2,000 men and women enrolled in four years

THAT a well planned educational program for employees of public utility corporations can be carried on with advantage both to workers and the management is demonstrated by the experience of the Pacific Electric Railway of Los Angeles, Cal. The success that has been achieved by this large interurban railway system is evidenced by the present enrollment of more than 600 em-

mental heads. The work done in this regard, however, was more of an advertising nature, it soon being learned that, given a bit of encouragement, there is an inherent desire in the average individual to broaden his knowledge. With the program well established, there has been no lack of interest on the part of employees; on the contrary, over-enrollment has become the problem frequently.

At present seven studies are being taught, six of which are presided over by teachers supplied by the Board of Education. The subjects are traffic management, personal leadership, public speaking, mathematics, business English, shorthand and typewriting. The classes are held in the afternoon from 4:45 to 5:45 and in the evening from 7 to 9.

Incentive to complete the courses is stimulated by issuing diplomas to those who attend regularly and successfully complete their studies. Furthermore, each employee is advised that his respective department head will be notified of the awarding of a diploma, and will be told of the employee's desire to improve.

Inasmuch as the Pacific Electric operates in four counties and its employees reside in widely scattered districts, the educational director has another duty to perform. He keeps in close touch with and knows the various studies available at all the institutions of learning within the district. Employees are urged to consult with him and he in turn recommends the school where their needs may be cared for best. Approximately 500 employees are placed in schools over the system through contact with Mr. Hill. Reports are furnished to the educational director from the school superintendent, the procedure lending encouragement to the students.

The interest manifested by the employees is exemplified in a recent class in personal leadership which had an attendance record of 98.5 per cent, and for which applications exceeded the capacity of the school room by 50 per cent when the class was reorganized.



An interested group of Pacific Electric employees in one of the class rooms at the company's headquarters in Los Angeles

ployees, and by the total enrollment of more than 2,000 men and women in the four years since the plan was inaugurated.

One of the discouraging elements for public utilities conducting educational work on a large scale is the prohibitive cost often involved. The Pacific Electric, however, has reduced the cost so that it is negligible compared to the results achieved, by co-operation with the city's educational board. When inaugurated four years ago under the direction of Earl W. Hill, appointed educational director, the only class was one of traffic management. Interest grew and results from this first effort were so satisfactory that broadening of the program and problems incident thereto were discussed with the Los Angeles Board of Education. The school authorities were deeply impressed with the interest created, and promised aid to the movement by furnishing paid inspectors in any class when attendance of fifteen students could be maintained. Thus encouraged, the educational director began broadening the program.

Two rooms located in the Pacific Electric Building were set aside for exclusive use as class rooms. Desks, blackboards, typewriters, books and other equipment were supplied by the company. Interest of employees was stimulated through the columns of the company's monthly magazine and by encouragement from depart-

Port Arthur Grants New Franchise

SEVERAL interesting provisions are contained in the franchise granted Jan. 11, 1928, by the city of Port Arthur, Tex., to the Eastern Texas Electric Company. The life of the franchise is 50 years. The clause on fares provides that the single fare is to be 10 cents. Tokens are to be sold at three for 25 cents, and weekly tickets for 40 cents, with an additional payment of 5 cents per ride. The franchise declares that in the future, the city may "fix and regulate a fair price for the service to be performed under this franchise." On the other hand, the railway has the right to abandon any line or lines which do not give fair returns on their valuation, or it may abandon a line on any street about to be repaved, if it desires to do so. If any change is made in the grade of any street the city must bear the cost of making the railway tracks conform to the new grade. The company pays \$25 a year annually to the city as reasonable compensation for this franchise.

Maintenance Methods *and* Devices

Adjustable Armature Winding Stand

SOMETIMES it is advantageous to have adjustable, movable armature winding stands in a shop. In the armature shop of the Binghamton Railway, Binghamton, N. Y., armatures of various sizes are in service which require different pedestal centers for mounting on the winding stand and shop conditions require



Convenient type of adjustable armature stand

frequent movement of the armatures to make room for other work. The stand shown in the accompanying illustration was designed to meet this condition. The A pedestals of this stand, which are 32 in. high over all and 22 in. wide, are made of 2½-in. x 4-in. oak, reinforced and bolted together, and equipped with 3-in. x 1½-in. iron swiveled wheels. One end of a 1-in. x 4-in. plank is bolted to either side of the inside of each leg of the stationary pedestal and the other end enters a guide on the movable pedestal formed by bolting two 1-in. x 2-in. oak blocks on the inside of either leg of the movable pedestal. This permits one pedestal to be moved toward or away from the stationary pedestal to accommodate the various

sizes of armatures. A safety latch is also provided to prevent the movable pedestal from passing beyond its maximum safe limit.

Life of Journal Boxes Increased by Chilling

WEAR on journal boxes comes principally where the truck pedestals make contact. The pedestal gibs can be replaced easily when they wear, and they are not expensive. The wear on the journal boxes, however, cannot be taken care of so easily, and frequently this becomes so excessive as to cause a large amount of lost motion in the trucks. Finally the box is worn through to the oil chamber in the bottom, particularly where cars operate on streets paved with chert or slag.

To overcome this trouble the Birmingham Electric Company, Birmingham, Ala., uses journal boxes chilled with a cast-iron chill in the mold. Some of these have been in service five years and show little wear, while soft gray iron boxes do not last more than three or four years. The use of chills for the journal boxes at the point where the pedestal comes in contact was found so successful that it was decided to carry the chilling still farther. Now the boxes are chilled where the cover fits on and also at the back where the box goes over the axle. This not only gives a much better casting but eliminates all machine work.

Referring to the accompanying illustration the part marked 1 shows the journal box with the chill surfaces painted white. Parts 2 and 3 are the chills used in the pedestal ways. Part 4 is the chill used where the cover fits and part 5 is the chill used for the back of the box where it goes over the axle.



1. Journal box with chilled surface painted white.
2 and 3. Chills used in pedestals.

4. Chill used where cover is applied.
5. Chill for back of box where it goes over axle.

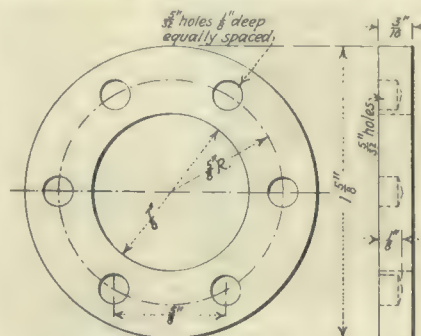
A careful check of these journal boxes made with chilling shows that they are just as accurate to dimensions as if they had been machined and the life is increased considerably while the cost of machine work is eliminated.

Sticking M-28 Brake Valves Cured

By G. E. GRAUBNER

Foreman Cincinnati Street Railway,
Cincinnati, Ohio

CONSIDERABLE trouble has been experienced on the Cincinnati Street Railway with M-28 brake valves becoming stiff. The cause was that the leather key washer gripped

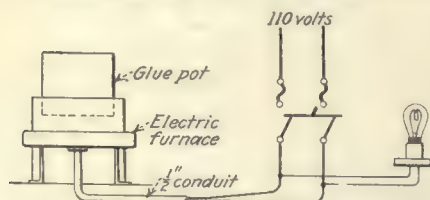


Details of key washer made from babbitt metal and turned to exact size in lathe

the brass seat in the valve casting after a few applications of air. After trying various kinds of oils, greases and compounds without much success, we hit upon the idea of making these key washers out of babbitt metal and turning to size in a lathe. These washers are made the same diameter as the leather washers but they are ⅜ in. thick instead of ⅝ in. Six ⅝-in. holes were then drilled ½ in. deep, spaced equally around the face. These holes were filled with graphite plugs, made by melting a good grade of No. 3 cup grease and stirring in as much finely ground graphite as it would hold. The valves receive their regular greasing at each "B" inspection, at intervals of 900 car-miles, at which time they are taken apart and greased thoroughly with a good grade of No. 3 cup grease. Some of these washers have been kept in use for more than four months without showing any signs of stiffness on valves that previously had given much trouble.

Safety Lights Warn and Save

SAFETY is of prime importance in the shop of the Binghamton Railway, Binghamton, N. Y. Here all machines are guarded carefully to prevent accidents and the shop organization receives intensive instruction in the advantages of playing safe at all times. An indicating or warning light is installed wherever electricity is used for heating solder, glue, etc., or where there is a possibility of damage being done if the men for-

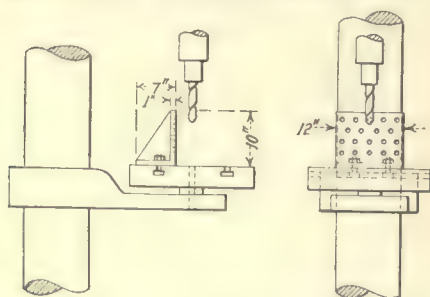


Connections for safety lamp at glue pot

get to turn off the current. The lamp burns continuously while the current is on the machine. The accompanying sketch shows how a lamp is connected across the terminals of an electrically heated glue pot inside the switch so that when the switch is opened the light is extinguished. It acts as a warning to the men that the current is on and can be observed readily from nearly any angle of the shop. At the close of the day it is easy to see at a glance whether or not all of the circuits have been disconnected.

Lever Support and Safety Stop for Drill Press

SPEED of production is considered of prime importance in the Woodside shops of the New York & Queens County Railway, Long Island City, N. Y. A large amount of drilling of small pieces is often necessary. For-



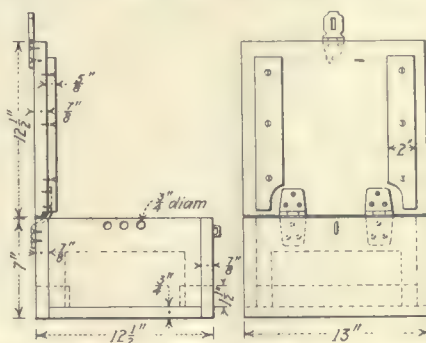
Drill press lever support and safety stop

merly it was the practice to align and clamp each piece to the drill press table. This clamping and unclamping took considerable time and resulted in low production. A casting

was made up to eliminate this work. It was designed to be bolted to the drill press table. The face is drilled with numerous $\frac{3}{8}$ -in. holes, which are used to anchor one end of a lever held by the operator to hold the work in position without clamping. This bracket also acts as a safety stop if control of the piece being drilled is lost. A noticeable saving has been effected by this simple casting.

Protecting Fare Registers from Injury

FARE registers on the New York & Harlem Railroad, New York City, are changed on a definite time basis and repairs and tests are made at the shop. Most of them are changed at the inspection houses which are located at some distance from the shop. They are transported to and from the shop in a supply car. The car transports all kinds of mate-



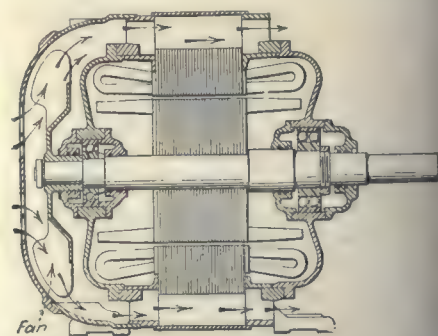
Protective casing for transporting fare registers

rial at the same time and it is found necessary to protect the registers against mechanical injury. This is being done by placing each one in a specially designed box. The box is made of $\frac{3}{4}$ -in. and $\frac{7}{8}$ -in. oak and is $12\frac{1}{2}$ in. wide, 13 in. long and 7 in. deep. It is designed with a substantial, hinged cover and provided with a hasp and staple to permit locking. Movement of the registers within the box is prevented by suitable blocks properly spaced and fastened to the bottom of the box. Three $\frac{3}{4}$ -in. holes bored near the top of each side board provide a means for lifting.

New Equipment Available

Air-Jacketed Motors for Dusty Locations

PRESENCE of dust, fumes and moisture in excessive quantities makes the use of standard electric motors undesirable. For such places an air-jacketed motor has been developed by the Wagner Electric Corporation, St. Louis, Mo. The entire motor is surrounded by a jacket open at both ends. Fan blades on the shaft extension between the sealed motor and its outer jacket draw air around



Cross-section of motor showing ventilating arrangement

the motor. The interior of the motor is virtually sealed, even the bearing housings being closed so that no impurities can get past the grease packing.

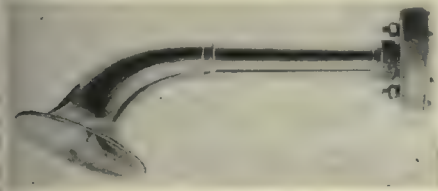
No changes have been made in the electrical principles of the motors themselves, the only changes being external. The frame housing, the motor proper and all bearings are substantially air-tight. The end shield is made of cast iron. It is rib-reinforced and has a substantial grating which protects the fan and provides an opening for incoming ventilating

air. The center shield is made of heavy sheet steel held in place by slot-head bolts. The fan is built in one piece. The conduit box is mountable in four positions.

The ball bearings are grease lubricated and sealed in dust-proof housings. The shafts are made slightly longer than those for standard motors to permit mounting of the fan.

Harmonious Tone to New Horns

"PNEUMOPHONIC HORN" is the trade name of a warning signal device being marketed by the Westinghouse Air Brake Company, Wilmerding, Pa. It has a clear, harmonious tone which is distin-



Warning horn

guished easily from other right-of-way noises. It uses little air and, as it requires no special reducing valve, operates successfully over a wide range of pressures and is of sturdy and durable design. The diaphragm or vibrating unit inclosed in a cast base is a substantial phosphor bronze disk uniquely balanced by a small weight. The bell of the horn is highly burnished, heavy-gage instrument brass.

This horn is available in various types and sizes to obtain different tonal qualities and in combinations for producing a pleasing chime effect.

Portable Lighting Unit

MANY advantages are claimed for a powerful portable acetylene flare lamp which has been added to the line of the Oxweld Acetylene Company, New York, N. Y. It is intended for night construction work and subway or tunnel building.

The fuel used is produced from Carbic, supplied in the form of cylindrical cakes of uniform size. Enough to operate the flare continuously for twelve hours can be placed in the lamp at one charging. If the use of the lamp is discontinued before the entire charge is used, the portion remaining can be left in the holder, or, being dry, solid and clean, can be

slipped back into the drum for use later.

This flare is planned to operate in all climates and in all weathers. It has a storm-proof burner, permitting its use even in the most violent gales. Construction is rugged and simple. There are but three parts, and these cannot be assembled incorrectly. Charging requires only a few minutes' time of one man. When put in operation the lamp needs no further attention until the charge is exhausted.

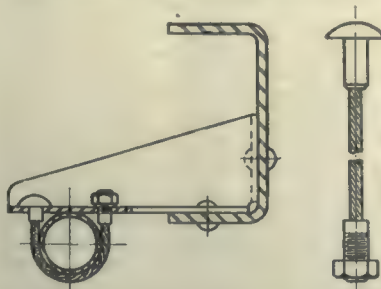
An automatic feed allows water to come in contact with the lowest cake of Carbic until sufficient acetylene is generated to drive the water out of the gas bell to a level below the bottom of the cake. This process is repeated as needed and gas is maintained at a pressure less than 1 lb. per sq. in. The Carbic never rests on a pad of sludge since the residue settles to the bottom of the water. If the lamp is upset accidentally, the water runs out of the container and gas generation stops immediately.

The Carbic light is available in several styles, which range in size from a hand lamp to the 8,000 cp. "Standard" model, which weighs 36 lb. empty and 115 lb. charged and stands 6 ft. 7 in. high with reflector raised. A double burner model, which illuminates in two directions, is furnished in about the same size as the "Standard" model.

Flexible Bolt Developed

DEVELOPMENT of the pre-formed type of rope makes possible attachment of fittings so that they become an integral part of the rope. For this purpose the American Cable Company, Chicago, Ill., has brought out a flexible bolt, which can be used to advantage for fastening piping, conduits or other equipment on cars where ordinarily a rigid U-bolt might be used.

Pre-forming the wires and strands of the rope to the exact helical shape



Method of attaching conduit by means of the flexible bolt

that they must assume in the completed rope results in a cable that does not require seizing and may be cut like a rod. This type of rope permits a close-fitting attachment to be slipped over the unseized end of the rope and to be processed so that the steel of the fitting cold flows into the interstices of the rope and thus becomes practically an integral part thereof. Such fittings can be capped for a head and threaded for a nut.

Touch-Up Spray Gun

FOR USE in painting where a fine spray is required the Alexander Milburn Company, Baltimore, Md., has recently developed a new touch-up gun. The extremely fine mist, or spray, procured with this gun is desirable for blending of colors on any surface, touching up scratches, mars or dents, stenciling and numerous



Touch-up spray painting gun

other fine painting operations, using lacquer, varnish or other finishes.

The new gun is quick in operation, is well balanced, has a stable base and is handled easily. Slight pressure on the trigger produces a very fine mist, so completely atomized that the color is blended with the surrounding painted surface. The gun can be adjusted to procure a hair-line spray for the finest kind of work. It is designated as K-Jr.

Six feet of air hose, with connections, are furnished with the gun. Various containers, either aluminum or glass, can be furnished so that many different colors can be kept on hand ready for use. Each container can be had with an air-tight cap so that paint can be kept in condition while in the cup. Aluminum cups are 8 oz. size; glass containers, 8, 16, and 32 oz. sizes.

American Association News

Executive Committee Meets

REPORTS of the several standing committees of the American Electric Railway Association, made to the executive committee at its regular meeting at association headquarters on March 30, indicate progress in the formulation of plans for the 47th annual convention in Cleveland next fall. A tentative outline of the convention program submitted by Chairman Frank R. Coates and a report by J. H. Alexander, chairman of the exhibit committee, were received and approved. The executive committee also discussed developments in national legislation of interest to electric railways and reviewed the status of association membership and finances.

Those present at the meeting included the following: R. P. Stevens, L. S. Storrs, J. R. Fitzpatrick, H. E. Weyman, Adam Meyer, G. C. Hecker, J. S. Kubu, S. J. Cotsworth, R. I. Todd, E. F. Wickwire, D. W. Snyder, Jr., W. H. Sawyer, Edward Dana, Labert St. Clair, F. C. J. Dell, John A. Miller, Jr., E. J. Murphy, Leslie Vickers, F. R. Coates, T. W. Casey, C. E. Morgan, G. A. Richardson, Charles Gordon, E. P. Waller, M. B. Lambert, T. A. Kenney, C. R. Ellicott and J. W. Welsh.

At the suggestion of C. E. Groesbeck, A. S. Grenier of the Electric Bond & Share Company was elected a member of the executive committee to fill the unexpired term of Mr. Groesbeck.

Report of the finance committee by Chairman T. A. Kenney indicates that dues received from member companies are within the budget estimates and that the process of absorbing directly in the dues of the association the expenses formerly covered by special assessments is proceeding satisfactorily in accordance with the plan in view when the constitution was changed last fall.

Work of the committee on publicity was outlined by J. W. Welsh in the absence of Chairman Paul Shoup. Mr. Welsh said that the advertising section of the association has aided several railways in the preparation of local advertising campaigns. Posters and booklets have been distributed to operating companies as aids in the merchandising of transportation. The moving picture films entitled "Wheels," "Readiness to Serve," "Mr. Auto Rider Becomes Mr. Car Rider," and "Fashion Show of Local Transportation" have been shown in a total of 508 places during a period of four months.

CONVENTION PLANS DISCUSSED

The general subject of "Economics of Transportation" is contemplated for the first day's program of the Cleveland convention, according to the report of Frank R. Coates, chairman of the program

committee. The second day will be devoted to the subject of modernization, the third day to outside viewpoints of the transportation industry. It is planned to devote Thursday's program to a discussion of the national aspects of the association's activities. Wide-spread interest in the luncheon meetings last year indicated the desirability of continuing this plan for the coming convention. Subjects contemplated for these luncheon meetings include rates of fare, interurbans, traffic, financing, taxation, management, employee relations, advertising, bus operation, and car design. It was suggested during the meeting that a luncheon session be devoted to the discussion of manufacturing problems in the industry. Another suggestion was that the time for serving luncheons be cut down this year so as to make more time available for the discussion of the several subjects. The general plan of the program committee was approved by the executive committee.

L. S. Storrs, managing director, who has returned to his duties after a period of illness and a trip to the Pacific Coast, reported for the committee on national relations in the absence of Chairman J. H. Hanna. Mr. Storrs outlined content of bills pending in Congress which affect electric railways. These include a bill defining the difference between commercial electric railways and street and interurban railways, which would take the latter out from under the jurisdiction of the Interstate Commerce Commission. This bill, introduced by Representative Johnson, is H. R. No. 12108. A bill to regulate interstate buses, introduced by Congressman Parker and known as H. R. No. 12380, seems to be receiving the approval of all parties interested in the interstate bus situation, according to Mr. Storrs, and shows promise of being passed at this session of Congress. The managing director supplemented his report for the committee on national relations by briefly reviewing his trip to the Pacific Coast and the situation of some of the far western transportation companies. In answer to a question by C. R. Ellicott, Mr. Storrs said that the new policy with respect to the publication of *Aera* seems to be working out satisfactorily and that the association's magazine in its new form is meeting the approval of the industry. President Stevens called attention to the diversity of articles in the April issue and to the manner in which *Aera* is interpreting the activities of the association and giving emphasis to the human element in transportation operation.

D. W. Snyder, Jr., read a letter addressed by the Illinois utilities asso-

ciations to the National Electric Light Association calling attention to the misleading information that is being circulated regarding the operation of the Springfield, Ill., municipal lighting plant.

Report of the committee on co-operation with manufacturers was made by Chairman E. F. Wickwire, and President Stevens for the Charles A. Coffin committee reported that there are indications that approximately ten entries will be made in this year's Coffin contest.

MORE SPACE FOR EXHIBITS THIS YEAR AT CLEVELAND

A letter from Chairman J. H. Alexander of the exhibit committee was read by Mr. Welsh. The exhibit layout this year provides for a total of 135,000 sq. ft. of space, which is considerably more than that available last year. By agreement between the program, exhibit and entertainment committees, the day set aside for annual inspection of exhibits will be Tuesday of convention week instead of Wednesday as heretofore. It is also planned to open the exhibits at 9 a.m. on Saturday, Sept. 22, and a recommendation was made to the transportation committee that special trains be arranged to arrive in time so that delegates may take advantage of this earlier opening of exhibits. Mr. Welsh announced that bulletins and reservation blanks regarding hotel reservations will go out in a few weeks.

A tentative outline of the entertainment program was presented by President Stevens, who reported that the entertainment committee considers dancing one of the most popular forms of entertainment and is planning to provide more time on the entertainment program than has been available for this feature in recent years.

President Stevens called attention to the coming meeting of the United States Chamber of Commerce and suggested the value of attendance by electric railway men. Requests have been received by the association from the Baltimore Chamber of Commerce and from the Birmingham Chamber of Commerce asking support for E. B. Jeffery, candidate from the Second District and Oscar Wells, candidate from the Fourth District, respectively.

The next meeting was scheduled for Wednesday, May 9, at 3 p.m. in Washington, D. C., during the meeting of the United States Chamber of Commerce.

New Association Members

FIVE companies, four state and sectional associations and ten individuals were elected to membership in the American Electric Railway Association at the meeting of the executive committee held on March 30. A list of

the companies and associations elected to membership follows.

RAILWAY

St. Paul City Railway, Minneapolis, Minn. This membership substituted for the Twin City Rapid Transit Company.

Wilkes-Barre & Hazleton Railway, Hazleton, Pa. This membership substituted for the Wilkes-Barre & Hazleton Railroad.

Boston, Revere Beach & Lynn Railroad, Boston, Mass.

MANUFACTURER

Anderson Brake Adjuster Company, Omaha, Neb.

The Collier Construction Company, Cleveland, Ohio.

STATE AND SECTIONAL ASSOCIATIONS

Central Electric Railway Association, Indianapolis, Ind.

Maryland Utilities Association, Baltimore, Md.

Midwest Electric Railway Association, Kansas City, Mo.

Pennsylvania Street Railway Association, Harrisburg, Pa.

Engineering Proceedings Ready

Proceedings of the Engineering Association covering the committee work and convention for the year 1927 are now being distributed to members. At last year's convention committee reports were presented at simultaneous divisional meetings, thereby making available more time for the general sessions. As a result a number of interesting papers on timely engineering topics were presented. These papers and the ensuing discussions are published in full in the Proceedings.

The papers included cover such subjects as track construction and maintenance, economies with modern cars, automatic substations, overhead maintenance, trends in motor coach engineering, and commercial aviation.

The work of the four general divisions of the Association covers many subjects of importance to the industry, together with a discussion of these matters on the convention floor. For the way engineer, such subjects as alloy steels other than manganese for special track work, rail corrugation, arc welding processes, wood preservation, and welded rail joints, will be found especially interesting. Rolling stock men will find in the reports of the Rolling Stock Division reports on motor coach design, car design, car lighting, noise reduction and other equally important subjects. The Power Division reports contain valuable information on automatic sub-stations, mercury arc rectifiers, trolley construction, and other matters of interest to power engineers.

The standardization work of the various divisions is another important phase of the Engineering Association work. Revisions of existing standards and practices, as well as new ones established, will be found throughout the committee reports.

Preferred Numbers Proposed

Preferred numbers have been proposed by the American Engineering Standards Committee. These have been informally approved by that body and are recommended to American industry for trial and criticism. According to a statement from P. G. Agnew, secretary

of the A.E.S.C., preferred numbers have as their purpose the elimination of economic loss involved in the haphazard and often needlessly numerous gradations of size that characterize most of our common commodities.

The fundamental elements of the system lie in the proposal to arrange standard size series so that each succeeding model in a series shall be larger than the preceding size, not by a definite amount, but by a fixed per cent. By decreasing the number of sizes within a certain range while retaining a sufficient number of sizes in all parts of the range a system of preferred numbers makes it possible to effect savings in materials, labor, storage space, gages, containers, catalogs, sales cost, etc. An example of increase by a fixed per cent rather than by a definite amount is found in the Brown & Sharpe wire gage which has been in successful and wide use since 1857.

C. E. Skinner is chairman of the general committee on preferred numbers and H. H. Norris is the representative of the American Electric Railway Association, while L. P. Alford is chairman of the working committee.

Three series have been approved informally, being geometric series that give respectively five, ten, twenty and 40 gradations in passing from one to ten, ten to 100, etc. The attached table gives the four series for the range from one to ten. For the range from 0.1 to 1.0 the numbers are approximately one-tenth as large. The committee states:

So far as possible, the numbers of the five series are to be used in preference to those of the ten series, these again in preference to those of the twenty series and these, finally, to those of the forty series. It is permissible to pass over from one series of preferred numbers to an adjacent series.

TABLE OF PREFERRED NUMBERS
Informally approved by the American Engineering Standards Committee

5 Series	10 Series	20 Series	40 Series
1	1	1	1.05
		1.12	1.12
		1.25	1.18
	1.25	1.25	1.25
		1.4	1.32
		1.5	1.4
1.6	1.6	1.6	1.5
		1.8	1.6
	2.0	2.0	1.7
		2.25	1.8
2.5	2.5	2.5	1.9
		2.8	2.0
	3.2	3.2	2.1
		3.6	2.25
4.0	4.0	4.0	2.35
		4.5	2.5
	5.0	5.0	2.65
		5.6	2.8
6.4	6.4	6.4	3.0
		7.2	3.2
	8.0	8.0	3.4
		9.0	3.6
10.0	10.0	10.0	3.8
			4.0
			4.25
			4.5
			4.75
			5.0
			5.3
			5.6
			6.0
			6.4
			6.8
			7.2
			7.6
			8.0
			8.5
			9.0
			9.5
			10.0

COMING MEETINGS OF

Electric Railway and Allied Associations

April 25-27—American Society of Civil Engineers, spring meeting, Washington Hotel, Washington, D. C.

April 25-27—American Welding Society, annual meeting, 33 West 39th Street, New York, N. Y.

April 26-28—Missouri Association of Public Utilities, Jefferson City, Mo.

May 2-5—Southwestern Public Service Association, Dallas, Texas.

May 4—Metropolitan Section, A.E.R.A., 33 W. 39th Street, New York, N. Y.

May 6-12—Union Internationale de Tramways, de Chemins de Fer d'Interet Local et de Transports Publics Automobiles, Rome, Italy.

May 8-11—United States Chamber of Commerce, Washington, D. C.

May 9—A.E.R.A. Executive Committee, Washington, D. C., 3 p.m.

May 9-10—Central Electric Railway Master Mechanics' Association, Erie, Pa.

June 4-6—Midwest Electric Railway Association, Hotel Baltimore, Kansas City, Mo.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 20-27—American Railway Association, Div. 5—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association), annual convention and exhibit, Atlantic City, N. J.

June 21-22—American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

July 27-28—Central Electric Railway Accountants' Association, Detroit, Mich.

Aug. 16-17—Wisconsin Utilities Ass'n, Transportation Section, Sheboygan, Wis.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

News of the Industry

New Wage Contract Sought By New York State Men

Employees of the New York State Railways in Rochester, Utica and Syracuse have filed a petition with President James F. Hamilton of the company, asking a new wage and labor contract and providing for a straight increase of 8 cents an hour and certain changes in working conditions. The increase would raise crew conductors and motormen from 55 cents to 63 cents; one-man car operators from 60 to 68 cents an hour; interurban operators from 57 to 65 cents an hour.

The union bases its demands for more pay on fare increases granted the company in the three cities. The railways will oppose this plea on the ground of ever-increasing maintenance costs, especially in paving.

Any settlement agreed upon in conferences between railway and union officials must be ratified by joint vote of the workers in the three cities.

President Hamilton is non-committal as to the company's stand on the wage demand, but said he would hear arguments of the union officials April 15 or thereafter. The new contract is effective May 1 and, in case an agreement is not reached by that time, any subsequent pact becomes retroactive.

Wage Negotiations in Prospect for Eastern Massachusetts

Employees of the Eastern Massachusetts Street Railway, Boston, Mass., are preparing negotiations for a wage increase when the present agreement is terminated on May 2.

Under the present agreement the wage scale is 69½ cents per hour. Operators are said to be seeking 82 cents per hour and one new uniform a year. The demands are in line with present concessions and remuneration granted employees of the Boston Elevated Railway. The various unions in cities served by the Eastern Massachusetts Street Railway have voted favorably for a wage increase.

Sunday Passes in Gary

A special Sunday pass, costing 25 cents and entitling the bearer to travel during the entire day anywhere on the interurban or city system, will be adopted April 15 by the Gary Railways, Gary, Ind. The Sunday passes will be good for any number of rides but only on the Sunday on which they are purchased. Passes may be purchased either from car operators or at regular ticket agencies.

The longest interurban line operated

by the company runs from Gary to Valparaiso, a distance of 26 miles. Other intercity lines connect Gary with Hobart, Hammond and East Chicago.

Locust Street Tube in Philadelphia Approved

An ordinance providing for construction and operation of the Locust Street surface-car subway was approved March 30 by the transportation and public utilities committee of the City Council of Philadelphia, Pa., and reported to the Council with a favorable recommendation. Where the new line will be connected with the Delaware River Bridge was not decided. The sum of \$10,000,000 has been appropriated for the abandoned Chestnut Street tube project which the Mayor and the Council will transfer to the Locust Street work upon approval of the voters at a referendum in the forthcoming primary. The entire project will cost about \$40,000,000 and construction will take three years. Under the ordinance the Philadelphia Rapid Transit Company will pay the fixed charges on the money borrowed by the city for the subway construction. After the cost of the project is met out of the rentals, the title to the line will be vested in the city.

Mayor Mackey has stated that he will call a conference on the Broad Street subway operating agreement soon after the primary of April 24. He stated that a conference on this point might have been called three months ago, but he preferred first to obtain engineering and operating facts for use in the negotiations. It was also announced by the Mayor that he had asked Comptroller Hadley to study the McChord finding and to report on the question of condemning the properties of the Philadelphia Rapid Transit underliers.

Council Adopts Belt Ordinance for Oklahoma City

The construction of an electric freight belt line at Oklahoma City, Okla., to cost approximately \$1,250,000, was assured March 27, when the City Council adopted ordinances clearing the way for this project. This line is to be constructed by the Oklahoma Railway to connect its Oklahoma City-El Reno line with the line connecting Norman, Oklahoma City and Guthrie, and intermediate points. The route lies mostly outside the western city limits. The road will be used for hauling freight traffic. Material is being assembled and about 250 men will be employed on the project. This improvement was described in detail in the *ELECTRIC RAILWAY JOURNAL* issue of March 10, 1928.

Contract Ratified in Scranton

Employees of the Scranton Railway, Scranton, Pa., are now working under a new agreement with the company, following the recent vote to ratify the pact which replaces the one that expired April 1. Under the new agreement motormen and conductors were not granted an increase. However, carhouse men under certain classifications were given an increase of 2 cents an hour, and bus drivers 3 cents an hour. Trainmen will profit by a change in working conditions as regards "tripper" or rush-hour lines. Under the new contract trippers will not leave the carhouse before 1:30 p.m. and will not work later than 7:30 p.m. Four hours pay will be the minimum rate for this kind of work.

The new agreement also provides for the issuance of 75 passes per month to motormen, conductors, and bus drivers, which will be good on all rail and bus lines of the company. Workers also approved their subscription of 50 cents monthly to be assigned to the pension fund.

A general increase of 5 cents an hour for all employees had been sought by the men.

Report on Knoxville Awaited

Until the report of Harland Bartholomew & Associates, planning engineers on the transit facilities of the city of Knoxville, Tenn., is received and passed upon by the city planning commission an ordinance conferring franchise rights on the Knoxville Rapid Transit Company to give service on six separate bus routes is being held in the Council's files. The ordinance is subject to passage on final reading, after amendment to conform with the recommendations of the engineers, the planning commission and the act of the Council, when it is determined that the Knoxville Power & Light Company will not give the service sought.

Under its contract with the city to conduct the survey the firm of St. Louis engineers was to submit its findings not later than April 1, the local commission to receive same and pass the survey along to the Council with recommendations. Briefly the report, which will probably now be ready by May 1, is expected to develop the needs of Knoxville in the way of transportation facilities with recommendations for meeting such needs.

The engineering firm is committed, to an extent, to a policy whereby the company now furnishing transportation service shall have the right to meet the additional transit ordered by the Council, and where such an agreement is not harmoniously reached any independent company or companies be granted franchises for furnishing this service.

Maryland Commission Denies Fare Decision Was Confiscatory

The Maryland Public Service Commission has answered the bill of complaint which has been filed by the United Railways & Electric Company, Baltimore, Md., and under which the company seeks to restrain the commission from preventing it from charging a straight 10-cent fare and charging two fares to the Halethorpe section. The commission recently handed down a decision permitting the United to charge 9 cents straight fare with three tokens for 25 cents. Hearings of the suit of the United Railways will open in the Circuit Court of Baltimore on April 30.

The commission declares that the maximum rate of fare the company is permitted to charge was adequate to provide for the necessary expenses and yield a fair return on the value of its property; that the percentage that was found would be the rate of return upon the fair value of the company's property, yielded by fares established by the order of the commission, was a sufficient rate of return to compensate the company for the use of its property in the public service; that the amount that was determined would be a proper annual allowance out of the earnings to provide for depreciation of the company's property was adequate for that purpose, and that the commission lawfully and properly required the company to abolish the second fare upon the Halethorpe line. When the commission handed down its decision it placed the Halethorpe territory on the one-fare zone.

The commission wants the court to dismiss the bill filed by the railway.

Articulation of Reading Lines with P. R. T. Suggested

The Philadelphia Rapid Transit Company, Philadelphia, Pa., proposed on March 30 that the Reading Company sell the two steam lines now in operation to Chestnut Hill, Newtown and Bustleton to the city of Philadelphia so they could be electrified immediately and made to serve as essential feeders to the \$100,000,000 Broad Street subway. Officials of the transit company pointed out that the Reading Company would be able to abandon operations of the Chestnut Hill division and that the city could effect a saving in time and money through the immediate creation of a feeder line which would be considerably more costly to construct.

The Philadelphia Rapid Transit Company's proposal was coupled with an offer to join with the Reading Company in 50-50 operation of buses in territories which both companies plan to serve. The new subsidiary under the P.R.T. plan would hold the certificate of operation between Philadelphia and Easton, Philadelphia and Trenton and on a new line to operate along Old York Road making possible the abandonment of trains by the Reading Company on the New Hope branch.

Through Agnew T. Dice, the Reading Company's attitude toward the Phil-

adelphia Rapid Transit's proposal was defined. He said that the suggestion that the city condemn railroads engaged in interstate commerce raised a grave question of law; that while the company did not object to conferences in the matter with anyone interested, it must be remembered that the plans of the Reading Company for electrification of all of its suburban lines, including those in question, was now nearing completion.

Final Briefs Filed in Interborough Fare Case

Briefs were filed on April 4 by the Interborough Rapid Transit Company, New York, in the case before the statutory court which is considering an application by the company for an interlocutory injunction preventing all parties concerned from interfering with

System in Houston Offered to City

A proposition to sell the railway system of the Houston Electric Company to the city was made by Jeff Alexander, manager of the company, at a hearing before the City Council to consider the removal of the car tracks from one of the principal streets and the substitution of bus service. He is reported to have said:

I should like to ask you to consider seriously the possibility of the city taking over the railway and running it as a city-owned project. It is impossible for any private corporation to continue giving something that costs more to operate than is received for the service.

We've been losing money since 1920. Then our properties were valued at \$6,000,000. Now the valuation has jumped to about \$9,500,000. Our earnings haven't increased in proportion to our capital



Rollin Kirby in the New York World

Star gazing

the collection of a 7-cent fare. With the case closed and all the briefs, affidavits and exhibits, numbering thousands of pages, before the judges, a decision is expected within a week or ten days.

Schedules Revised in Toledo

Schedules on the Cherry Street line of the Community Traction Company, Toledo, have been revamped so that much better railway service may be provided to compete with other means of transportation. The new schedules provide for an average speed of 11 m.p.h., which will cut nearly fifteen minutes time off the round trip formerly in effect. Rush-hour service has also been speeded up, and at the peak there will be a 3½ minute headway.

Another new feature of the service on the line is the proposal to establish bus service on the owl runs.

New stops have been marked with a brilliant orange stripe around near-by poles at the curb, adding to the visibility and conforming to the color of the cars on the line.

investment and we can't go to the stockholders each year and ask them to put more money in the railway on the strength of promises. Out-of-town investors just won't continue to invest their money here in a losing proposition.

The city must buy the company or subsidize it, or the matter will end in the courts, he declared. Mr. Alexander is also reported to have said:

The taxpayers are going to have to pay for the railway service in the end, so why not let the city supervise that expenditure. Let the city buy the system. People are not getting the service they are entitled to, and we can't give it to them. We'll be glad to have the properties appraised by any fair board of appraisers you appoint and take their offer.

Pointers from Cleveland

Personal Pointers, containing information pertaining to employee activities, is to be distributed from time to time by the Cleveland Railway, Cleveland, Ohio. These sheets will also tell about the workers of the safety, welfare and employment divisions of the company.

Status of Massachusetts Bills

All the propositions pending before the Massachusetts Legislature concerning the future of the Boston Elevated Railway are now before the House committee on ways and means. The bill which has the backing of a committee report is house bill 1129, which calls for public ownership, and on which the fight is centering at the present stage.

This bill could create a metropolitan transit commission and invest it with authority to purchase the Boston Elevated under the option contained in the 1918 control act and to operate the system in Boston, Cambridge, Somerville, Medford, Malden, Everett, Revere, Chelsea, Newton, Arlington, Brookline, Watertown and Belmont. Advocates of this measure contend that there is no other bill that has any reasonable expectation of passing the Legislature, and opponents of it are backed by the Boston Chamber of Commerce and by a strong minority committee report in the Legislature.

It may be significant that the House committee on ways and means has authority to consider all the Elevated bills, and can report any one of them as it is or in amended form, or can report a resolve for further study of the situation.

Express Service for Hartford Baseball Fans

The Connecticut Company, Hartford, Conn., is to cater to the baseball fans of the city during the coming summer. In a recent conference between N. J. Scott, manager of the Connecticut Company at Hartford and J. W. Pyne, business manager of the Hartford Baseball Club, it was arranged that the company would operate express trolleys to the ball park. Complete details have not been announced but preliminary plans provide for express cars to run in advance of regular cars, thus cutting the running time a half hour.

Employees of insurance and brokers' offices quit work early enough in the afternoon to witness the Eastern League games played at the Buckeye Stadium, but in the past it has been difficult for them to reach the stadium by trolley in advance of game time due to the many stops.

Sleet Storm in Ohio Damages Utilities

Damage to the extent of more than \$750,000 to various utilities is reported as the result of the sleet storm which swept over northwestern Ohio on March 29. The city of Findlay was without wire communication and electricity for more than a week. The Toledo, Bowling Green & Southern Traction Company was able to restore partial service April 1, but it was said that it would be several days before Findlay is completely lighted again. Many poles were thrown across the tracks of the interur-

ban between Toledo and Findlay, and while service was badly crippled it was stated on April 4 that the road was rapidly emerging. The loss to this company is placed at \$100,000.

The Taxi and Railway in Seattle

Declaring that the present taxicab rates are making deep inroads into the earnings of the Seattle Municipal Railway, Seattle, Wash., Robert MacFarlane, representing a group of unnamed business men, recently filed a request with the City Council for an exclusive franchise for a taxicab-operating \$1,000,000 organization, to be formed by a merger of existing taxicab concerns. Mr. MacFarlane said the group he represented was prepared to post \$25,000 bond if the Council would consider its offer. His plan provides that the taxicab concerns given the franchise would pay the city 2 per cent of its gross earnings, with a minimum of \$25,000 a year. Details of regulation, rate-making and parking would be left to the City Council under the proposed plan. In effect the plan calls for a monopoly for the organization operating the taxicabs. The plan stipulates that if a franchise be given another taxicab company the 2 per cent earnings tax would be forfeited. Mr. MacFarlane said:

Lack of proper regulation and supervision has made a "jitney" out of practically every taxicab today in certain classes of service, it is actually cheaper to ride in a taxicab than on a street car. An actual survey discloses that present taxicab rates are resulting in an increase of approximately \$600,000 a year. This means a correspondingly less volume done by the street cars.

The proposed merger has not met with unanimous approval of the taxicab operators. Organized labor is also expected to take an active hand in the question, since the rate war has directly affected wages of drivers, members of the taxi union declare. Present union agreements with operating companies expire May 1, and new agreements are now in the making. It is stated drivers will insist on a straight zone-rate wage being paid on cabs operating on a zone-rate or part zone-rate basis. City officials have voiced their approval of any "reasonable plan" that would end competition.

The *Seattle Daily Times* says the figures show a steady decrease in railway revenues during the last few years, but fail to show that the recent low-rate taxicab competition has had any marked effect on railway revenues. The *Times* statistician states that during October, November and December, 1927, and January, 1928, a period when the taxicab rate war had gathered full momentum, the total in railway fares collected came to \$1,910,332. He also shows that during similar months of the preceding year the receipts were \$1,955,749, so that there was a decrease of \$45,526. This decrease appears to be a part of a steady decline in railway riding. During the last few years the decrease has been marked.

Reconstruction Order in Omaha Termed Unfair

The Nebraska Supreme Court has sustained the appeal of the Omaha & Southern Interurban Railway, Omaha, Neb., from an order of the State Railway Commission that it reconstruct a highway bridge over its lines at a point in Sarpy County, and ordered the case dismissed without prejudice to another order should conditions warrant one in the future. According to the court the commission is without jurisdiction or power to order a crossing of this kind at the expense of a common carrier to meet a contingency that may never happen, and it may make such an order only when it is clear that the public convenience or necessity requires such construction. This overhead crossing formerly carried a road used before automobiles came into use, but was abandoned by drivers because of its grade. When the bridge collapsed the county board brought suit to require its reconstruction.

The court says that the intent of the Legislature was that safe and adequate means for crossing railroad tracks be provided where they were needed; further, that it would be assumed that the legislators knew that as the cost of such construction eventually was paid by the public, it would not require that to be done at public expense which was not for its convenience and use.

Yesterday, Today and Tomorrow Via the Trolley

The trolley may be troubled, as indicated by Raymond S. Tompkins in the April issue of *American Mercury*, but the conclusion of the author, after a careful study, is that the future of the electric railway industry looks reasonably bright, at any rate to those who take the view that in the big cities nothing else but street cars will do the transportation work efficiently. In the face of many discouraging features Mr. Tompkins, affiliated with the United Railways & Electric Company, Baltimore, and a former newspaper man, sees optimism all along the line in the possibility of restoration of the electric railway as a transportation service to full vigor and efficiency. He traces briefly the history of the electric railway from the day of the horse car to the glamorous installation of electric cars in Baltimore, Cleveland and Richmond. One of the big movements in this industry stressed by the writer is the change in attitude on the part of the railway managements toward the public they serve. With them today public relations is a telling factor in the selling of rides.

Extension Again in Chicago

The franchises of the Chicago Surface Lines have been extended by the City Council for another 30-day period. This is the fourteenth time that the franchise, which expired Jan. 31, 1927, have been extended.

Transportation Progress Noted at Connecticut Exhibit

The Connecticut Company featured the Home Progress Exposition, held at Hartford, Conn., March 24-31, with the exhibition of one of the latest model street cars. This booth attracted much attention and elicited considerable praise. So attendants at the booth might explain the mechanism the body was cut away exposing the motors and brakes. The car formed only part of the company's exhibit.

L. S. Storrs, formerly president of the Connecticut Company, and now managing director of the American Electric Railway Association, presented to Yale University a quaint model car, which the university was kind enough to loan to the company in connection with the exhibit. The model is a replica of the pioneer electric car operated in Derby, Conn., in 1888. This car marked, it is said, the advent of the overhead trolley in Connecticut. The car was 18 ft. long.

At the booth were interesting photographs from days gone by depicting cars, long out of commission, and gangs of bearded working men. There was a picture of the State Street carhouses, Hartford, taken in 1885. There was also a picture of the original trolley car operated in Meriden in July, 1888, and the first car to make its appearance in Hartford on Sept. 12, 1888, on the Wethersfield Avenue line. The photograph of a Hartford horsecar taken 50 years ago came in for much attention and comment.

Columbus Council Postpones Franchise Negotiations

Action on the new franchise for the Columbus Railway, Power & Light Company, Columbus, Ohio, has been postponed by the City Council until May 15.

The chairman of Council's utilities committee presented the company's suggestions to Council after conference with C. G. Slater, president and general manager of the railway. Mr. Slater said that extensions sought would be granted and better service would be provided on all lines if the company were permitted to speed up its cars. He wants the legal limit raised to 25 m.p.h., the "skip stop" system established and all streets with car tracks designated as main thoroughfares as a means for speeding up service.

Unless the concessions are made it will be impossible for the company to grant the extensions requested by Council. Mr. Slater said the company had been losing money because of the taxicab rate war and price cutting competition.

The Columbus Railway, Power & Light Company has been operating in the city without a franchise since Feb. 4, 1926. A 25-year franchise was rejected by the company in October, 1926, after the City Council had amended an ordinance to compel the company to extend Broad Street service from Hague Avenue to the west corporate limit. The

company contended this could not be accomplished because of the difference in gage of track. This together with objections to other minor stipulations was given by the company as its reasons for rejecting the franchise.

Municipal Ownership Defeated in Madison

At the election on April 3 the people of Madison, Wis., by a vote of about 8,000 to 5,000 defeated the referendum question providing for the acquisition of the Madison Railways by the city. Official figures are not as yet available. Madison also defeated municipal ownership of the railway eight years ago.

Both newspapers in the community, one a conservative and the other a La Follette organ and avowed municipal ownership newspaper, favored acquisition of the property. In fact, the conservative paper staged meetings in favor of municipal ownership, at one of which Carl D. Thompson, secretary of the Public Ownership League of America, appeared.

Swope District Pushing Through Service in Kansas City

Members of the Swope Land Improvement Association and residents of the Swope district of Kansas City, Mo., are agitating for the extension of railway and bus service to the downtown district. A number of civic meetings has been held and petitions circulated, and some support for the project has been promised in the City Council. More than 500 names have already been obtained on petitions requesting rerouting, and 1,000 are expected by the time the mass meeting is held.

F. G. Buffe, vice-president in charge of operations, said the Kansas City Public Service Company could not seriously consider the request for through cars until September, due to the unusual number of cars taken from service during rehabilitation. The small cars now used on the Swope line are not suitable for downtown use, and the company would not have enough other cars to use until the program of rehabilitation has been completed this fall.

Foreign News

English Tramway to Use Buses

At the annual meeting of the Yorkshire Electric Tramways, West Riding, England, it was decided that no dividend would be paid on the ordinary shares in order to preserve all available money to buy buses for use on the tramway lines which have been abandoned. It was said that owing to bus competition the element of good will has disappeared, reserves have been expended and further abandonments would doubtless follow.

Charge for the Return of Lost Articles in Glasgow

Small fees are now charged by the Glasgow Tramways to owners of property which has been lost on the cars when they go to the lost property room to reclaim it. Last year more than 20,000 articles found on the cars were returned to their owners.

New Tramway Line for Tallinn, Esthonia

Construction of a tramway line is now under consideration by the city street car administration of Tallinn, Esthonia, a republic on the Baltic Sea. The proposed line would connect the Vabaduse Platz in the center of the city with Kipli, the peninsular district of the suburbs, a distance of 6 miles. The cost is estimated at \$367,000.

When the new line is completed it is planned to lay a double line in the Suur Tartu Maantee. Construction of a street car connection between Tallinn and Piritu, a popular seaside bathing

beach and summer resort some 5 miles distant, is also contemplated.

Austria Criticised for Abandoning Railway Electrification

Great disappointment and surprise are felt throughout Austria at the decision of the authorities to proceed no further with the electrification program of the Austrian State Railways and to utilize for other ends the remainder of the funds set aside for this purpose out of the international loan.

It is claimed that portions of the electrified lines now in operation are working at a financial disadvantage. Owing to the consideration of the possibility of imported coal becoming cheaper and too favorable estimates of the cost of electrification, the initial calculations are said to be inaccurate.

This decision is being very sharply criticized by those who had praised the soundness of the government's former argument that the development of the country's water power would keep within Austria vast sums of money now spent on coal from abroad.

German Railway Bonds Offered

The Western Electric Railways Corporation, which operates interurban electric railway and automobile bus lines in Westphalia, Germany, offered on March 1 \$1,750,000 first mortgage twenty-year sinking fund 7 per cent bonds in the American market at 98 and interest, to yield about 7.20 per cent. Earnings are guaranteed by the municipalities which own these lines.

Recent Bus Developments

\$5,392 for Louisville Franchise

The Louisville Railway now owns the blanket franchise to operate buses on the streets of Louisville, Ky., for twenty years. At a perfunctory auction, at which no other bidders appeared, Thomas B. Crutcher, member of the Board of Public Works, awarded the franchise. The upset price named in the ordinance, under which the franchise was sold, was \$5,000 and the \$392 represents half of the advertising cost. James P. Barnes, president, bid in the franchise for the railway and deposited a certified check for the amount. The sale now goes to the General Council for ratification. Service on the announced bus lines will be started at once.

John Chandler, attorney for a group of jitney bus operators, asserted in a statement afterward that the sale for a mere nominal price to the Louisville Railway justified the allegation of the petition of the independent bus operators that the ordinance was passed exclusively for the Louisville Railway, in order to give it a monopoly of the city streets. The case may go to a Court of Appeals.

Protest from Washington Property

Officials of the Washington Railway & Electric Company will protest to Maryland authorities over an attempt of a bus line operating between Gaithersburg, Md., and Washington, to secure an intrastate rating. Over a large part of its course the bus line parallels an interurban line of the Washington Railway & Electric Company. Although under the present laws there can be no regulation of the interstate business of this bus route between Maryland and the District of Columbia, the electric railway will ask the state authorities to deny the bus line permission to compete with its line between Maryland points.

Protection for Railway in Ohio

The Ohio Supreme Court has upheld the Stark Electric Railroad in its fight against competition of the Sebring-Alliance Bus Company. Carrying a state certificate to the Supreme Court on the ground that it was illegal, the Stark Electric won a ruling which prevents the Sebring-Alliance Bus Company from making Sebring and Alliance, 4 miles apart, terminals.

Passengers boarding buses in either city must alight at the corporation line of the other, the Supreme Court ruled in referring the bus certificate back to the Ohio Public Utilities Commission for a revision. This ruling was made in face of petitions from bus riders, and also in face of testimony which shows

that the two transportation companies enter Alliance at points more than half a mile apart.

The fight was led by E. W. Sweezy, general manager of the Stark Electric Railroad, who for months has authorized court battles preventing increased competition between the railway and bus companies.

P.R.T. Seeks Approval of Bus Purchase

The Philadelphia Rapid Transit Company, operated by Mitten Management, Inc., has bought the Quaker City Cab Company and three small suburban bus concerns for \$1,825,000, \$2,325,000 less than their combined assets. This was announced by Ralph T. Senter, president of the transit company, before the Public Service Commission on April 4 in support of an application for approval of the transaction.

In an effort to prove that the rival companies were bought at "bargain prices," Mr. Senter introduced a consolidated balance sheet showing their assets as \$4,150,000. Separate statements revealed that all except \$650,000 of the assets belonged to the cab company. Its excess of assets over liabilities was given as \$3,500,000.

The Mitten organization operates the Yellow Cab Company, local trolley, subway-elevated and bus lines in the city of Philadelphia and several interurban bus lines running out of that city.

Contention Over Operations in Milford

A bus war is being waged in Central Massachusetts with Milford the strategic point. The cause is bound up with the filing of petitions of the Johnson Bus Lines Company, Inc., and the Medway & Dedham Bus Lines for permission to operate. Officials of the company have informed the selectmen of Milford they do not intend to operate buses over the proposed routes as long as railway service is maintained, but that they understand some of the railway lines of the Milford & Uxbridge Street Railway, which now serves that territory, are to be discontinued. On the other hand, word has also reached the Milford Selectmen that a new trolley and bus line company is in process of formation as a result of the recent sale of the Milford & Uxbridge Street Railway to Citron-Byer Company, Clifton, N. J.

The bus company operating between Medway and Dedham was also opposed recently before the Massachusetts Public Utilities Department by Fred A. Cummings, representing the public trustees of the Eastern Massachusetts Street Railway. He contended that a certificate granted to the bus company for oper-

ation between Blackstone and the Boston-Dedham boundary line would have a disastrous effect on the railway lines in Walpole, Norwood, Westwood and Dedham.

Parker Bill Up on April 10

The Parker interstate bus bill will be considered at a hearing April 10, according to an announcement from the Interstate Commerce Committee of the House. The legislative sub-committee of the American Automobile Association's bus division, which sponsors the measure, will present witnesses at the hearing. It is understood that the electric railway bill introduced by Representative Johnson of Indiana will be given a hearing after the bus measure is disposed of, although the exact date for this has not been determined. Extended reference to the provisions contained in the Parker bill was made in the issue of the *ELECTRIC RAILWAY JOURNAL* for March 31, page 559.

Franchise Sought by New York & Queens County

The Queens-Nassau Transit Lines, Inc., is petitioning for a franchise to operate a bus route to be known as the Murray Hill route. In effect, it will be an extension of the system of electric railway routes now operated in the Borough of Queens by Lincoln C. Andrews as receiver of the New York & Queens County Railway. The rate of fare on the proposed Murray Hill route will be 5 cents. It is proposed that free transfers be issued upon payment of cash fare from the cars of the New York & Queens County Railway to the buses of the Murray Hill bus route. Nine advantages of this route are listed in the application. The Murray Hill section would be connected with Jamaica, College Point, the Main Street section of Flushing, Jackson Heights and Corona by the free transfer privilege.

The Queens-Nassau Transit Lines, Inc., is organized under the Transportation Law of the state of New York. All its stock is held by the receiver of the New York & Queens County Railway. The receiver has received the consent of the bondholders committee of the railway to operate the proposed bus route. The present organization of New York & Queens County Railway will be used to operate this route.

Don't Need Bus in Brighton

The City Council committee on jitney licenses has rejected the petition of the Boston Elevated Railway, Boston, Mass., asking for authority to operate a bus line in Market Street, Brighton, between Western Avenue and Washington Place. An opinion derived from a hearing on the matter showed the public in that section to be favorably inclined to the railway service now in existence there.

Twenty Buses Destroyed in Newburgh Fire

Fire destroyed the garage of the Newburgh Public Service Corporation, Newburgh, N. Y., on the morning of March 30. Of the 20 buses in service in the city only one was saved. In addition, three private automobiles and five trucks were burned. The loss may exceed \$200,000, but the plant and equipment were fully covered by insurance.

The city was entirely without bus service Saturday morning, but arrangements were made at once to furnish a temporary service. Spare buses were secured from the Hudson Transit Corporation and the Cornwall and other lines, and arrangements were made to secure buses from out of town.

were not in regular service. The building covered a plot 200 ft. by 60 ft. It was valued at \$30,000.

Bus Scheme by Jamaica Company Not Sanctioned

The management of the Jamaica Public Service Company, Kingston, British West Indies, has been in communication with the government over the proposal to establish a bus service in the corporate area. The company intends to operate five or six buses of about 4½ tons but the scheme has been held up because it is in conflict with the motor car law, which prohibits motor vehicles of more than 2½ tons on the island.

with the same hourly schedule rendered by the interurban. On March 16 the receiver of the company was authorized to make this substitution by the court.

The service is being installed because of the possibility of a bridge being constructed across the Ohio River between Evansville and Henderson in the next two years. Work will very likely start some time this year and after the bridge is in operation, service by interurban over the ferry would be slow and undesirable to the public. The company has therefore requested to use buses.

Reading and the Bus

Public Service Commissioner Benn has approved the plan of the Reading Company to spend \$1,000,000 for buses and garage facilities at Pottsville and Doylestown during the first year of operation by the newly formed subsidiary, the Reading Transportation Company. The company is petitioning for transfer of 95 per cent of the stock of the subsidiary to the Reading Company. The testimony before Commissioner Benn dealt mainly with the program of bus operation intended for Schuylkill County. He overruled the objection of the Schuylkill Railways, Schuylkill County Railway and the Schuylkill Transportation Company that an interstate carrier such as the Reading Company could not acquire stock in an intrastate company.

When the hearing was concluded Commissioner Benn announced that the Reading application would be laid before the entire Public Service Commission with a recommendation for favorable approval.

Permanent Franchises Sought for Syracuse

Permanent franchises, to supplant the present temporary permits which expire this summer, are sought by the Syracuse Co-ordinated Bus Lines, Inc., which operates the bus lines of the New York State Railways in Syracuse.

Action by the municipal administration is expected soon, according to Benjamin E. Tilton, vice-president and general manager of the railways. Mr. Tilton will base his argument for the proposal on the fact that his company has put bus feeder lines and extensions into operation and has plans for many more similar lines.

The company will ask a fare for bus lines similar to that on the trolley lines. The bus fare now is 7 cents with transfer privileges. The trolley fare is 10 cents cash and 7½ cents for tickets.

Substitution on One Line in Oakland

The Key System Transit Company has been authorized by the California Railroad Commission to abandon service on its Rockridge line in the city of Oakland. It is planned to substitute bus service over the temporary route now in operation.



McGraw-Hill Photo

Fire did deadly work when it destroyed all but one of twenty-one buses

All the buses in the garage had been filled with gasoline immediately after the finish of the day's run and were arranged in the garage so they might be run out quickly when the morning work was resumed. The bus that escaped destruction by the fire was one used to take the employees to their homes after the system was shut down for the night. It was engaged in this task when the fire was discovered.

The garage was located on Wisner Terrace near the South Plank Road. The building was principally frame. It was built originally to house the street cars, but since the buses were installed to replace the local trolley lines, it had been used to store the buses when they

Evansville & Ohio Petition To Be Heard

April 9 has been fixed by the Indiana Public Service Commission as the date of a public hearing on a petition of the Evansville & Ohio Valley Railway for the right to run passenger bus service from Evansville, Ind., to Henderson, Ky. The company has been operating an interurban railway from Evansville to Henderson since 1912, over leased tracks of an abandoned line of the Illinois Central to the Ohio River where the interurban cars were ferried across the river and then operated into Henderson, Ky. It is proposed to succeed this service very shortly by bus operation

Financial and Corporate

Legislative Status at Boston Stockholders' Meeting

At the annual meeting of stockholders of the Boston Elevated Railway, Boston, Mass., held April 2 all acts of the directors in 1927 were ratified by a vote of the stockholders. No other business was done at the meeting, but a number of questions was asked about the status of proposed legislation. The only definite information that could be given was that no matter what the Legislature did this year there could not be any material change in the operation of the property in much less than two years. Should public ownership be adopted it might not require a full two years to execute the taking of the property.

After the Legislature has acted the stockholders will be called into special session immediately, if their vote or opinion is required; they will have nothing to say about the conversion of the property to public ownership, however, because that can be done by the commonwealth without their approval, under the option clause in the public control act of 1918.

Traffic, Fare and Wage Figures

Electric railway passenger traffic continued to fall off at an increasing rate during the month of December. The number of revenue passengers, including bus passengers, reported by 193 companies to the American Electric Railway Association for December, 1927, compared with December, 1926, is as follows:

December, 1927	819,663,893
December, 1926	844,205,989
Decrease, per cent.....	2.91

The average cash fare in cities of 25,000 population and over:

	Cents
Jan. 1, 1928.....	8.9177
Dec. 1, 1927.....	7.9993
Jan. 1, 1927.....	7.7790

Average maximum hourly rates paid motormen and conductors in two-man service by companies operating 100 or more miles of single track:

	Average Hourly Rate cents	Index Number 1913 = 100 Per Cent
Jan. 1, 1928.....	57.27	210.17
Dec. 1, 1927.....	57.27	210.17
Jan. 1, 1927.....	56.88	208.73

Dividend Passed in Harrisburg

For the first time since April, 1921, the Harrisburg Railways, Harrisburg, Pa., has been forced to pass the semi-annual 3 per cent dividend on its preferred stock. This makes a total of 29 per cent in unpaid dividends on the preferred stock accumulated in the last twelve years.

During 1927 the Harrisburg Railways transported 31,141,287 passengers

as against 32,477,229 for the year previous. In 1923 the number of passengers hauled was 34,560,489. Despite the falling off in traffic last year the company's cars operated 12,700 more car-miles than in 1926. The company paid out in 1927 \$131,259 for track renewals and this year's program is estimated at approximately \$133,000, exclusive of what the railway will have to pay toward the cost of widening a subway in Harrisburg's business district.

Deal May Be Delayed

Modification of terms suggested for plan by which Insulls would enter other Indiana Railways

TERMS of security exchange in the Insull-Morgan plan and agreement for consolidation of the Terre Haute, Indianapolis & Eastern Traction Company properties with the power distributing properties of the Central Indiana Power Company have been so altered that many more months may elapse before the consolidation will be presented for approval of the Indiana Public Service Commission.

Committees acting for security holders of the Indianapolis & Martinsville Rapid Transit Company, the Indianapolis & Northwestern Traction Company and the Indianapolis, Crawfordsville & Danville Electric Railway have been notified by Halsey, Stuart & Company, readjustment managers, that guarantees of interest and sinking fund payments had been withdrawn in the plan for securities they were to receive in the new consolidation setup.

QUESTION OF GUARANTEES PROVOKES DISCUSSION

New stock and bonds were to have been issued by the consolidation in the name of the Indiana Central Rapid Transit Company, formed by consolidation of the three interurban divisions. It was part of the first agreement that the new bonds and stock of this company be protected by annual sinking fund charges and interest payments guaranteed by the Indiana Electric Corporation, the operating company.

While the Central Indiana Power Company would like to add the electric distribution territories covered by the railway lines to its own far-flung Indiana system, the tone of the recent notice makes it appear that the Insull utility does not intend to assume responsibility for profitable operation of the railway lines. The power companies could expect profitably to devote some of their earnings to rehabilitation of the interurban lines, whose power distributing business they would like to have, but they do not appear to care to hazard the risk of operating the railway lines to the extent of making irrevocable guarantees.

Additional Securities to Be Authorized for Richmond

At the annual meeting of the Virginia Electric & Power Company, Richmond, Va., to be held on April 16, stockholders will be asked to vote on the question of authorizing the issuance of \$8,000,000 of first and refunding mortgage gold bonds. This is part of a \$20,000,000 issue, of which \$12,000,000 is now outstanding.

Stockholders also will vote on amending the charter to provide for an increase of \$5,000,000 in the authorized preferred stock of the company. The increased stock is to be 6 per cent cumulative preferred of the same class as the 6 per cent cumulative preferred now outstanding and is to be sold from time to time as the directors shall determine.

This action by the stockholders is desired in order that the company may have further securities of these classes available for prompt issue from time to time in the event it is deemed advisable to finance future requirements in this way.

Inclusion in New York Central System Sought

The Fonda, Johnstown & Gloversville Railroad, a short line connecting with the New York Central Railroad, has filed a brief with the Interstate Commerce Commission asking that the commission take action providing for its inclusion in the proposed system to be created by the lease by the New York Central of the lines of the Big Four and the Michigan Central railroads, for which application is now pending before the commission. The brief says:

We submit that in order to preserve and maintain this intervenor's line in a healthy condition to serve its territory as a part of any national system of transportation, it must be included in the applicants' system, and that since the applicants are seeking the benefit of a portion of the consolidation legislation enacted by the Congress for the purpose of establishing such national system of transportation, they are under the duty of either including it in their system or making in their plan reasonable provision for its inclusion therein.

We, therefore, respectfully request that this commission shall take such action in the premises as it may deem necessary for the purpose of bringing about this result.

Results in Toledo Improve

Increased industrial activities and more favorable weather conditions have improved railway and bus operating results in Toledo. February operations of the Community Traction Company showed \$298,909 total revenue as against \$294,147 for the corresponding month last year. There was, however, a net deficit of \$15,090 to the stabilizing fund after expenses, taxes, reserves and charges made under terms of the Milner ordinance. This brings the total deficit to \$1,303,073.

The sinking fund requirements have

now ceased and indications are a change in results will be shown favorable to wiping out the deficit over a period of years. The sinking fund requirements have been \$25,000 or more each month.

Under the terms of the Milner ordinance in less than three years the voters will be called upon to extend the grant or begin a fifteen-year period of amortization of the property through fares collected. It is hoped to make a big cut in the deficit in this period or else reach some agreement on a new way out of the situation.

Merger Proposal in Washington Modified

The Public Utilities Commission of the District of Columbia has made public its changes in the merger agreement covering the Capital Traction Company, the railway lines of the Washington Railway & Electric Company and the Washington Rapid Transit Company. The changes now go to the companies for their approval.

The \$50,000,000 rate base called for in the agreement, which has been one of the features most vigorously attacked, was approved for a temporary period of ten years, after which the commission prescribes a revaluation.

The commission, however, removed the 7 per cent return provision from the agreement, and in its place inserted a clause which declares that the merged company shall be "entitled to earn a fair and reasonable" return on the \$50,000,000 valuation.

The commission also added another provision which stipulates that the present rate of fares shall continue in force for one year after the merger.

A letter outlining the modifications made in the agreement will be sent to the companies, with a recommendation that the changes asked be made, so that the document may be sent to Congress without further delay for ratification.

Among other changes which the commission recommended were:

That the commission be relieved of duty of nominating the three public representatives to serve on the board of directors of the merged company.

That the companies be relieved of paying certain costs for paving between their tracks.

That the companies continue to share the expense of repairing bridges over which their lines operate.

That nothing be included in the revised agreement which would limit the powers of the commission.

Morris County Receivers Directed to Pay Tax

Federal Judge William N. Runyon, of Newark, N. J., has signed an order directing the receivers of the Morris County Traction Company to pay taxes due to nineteen municipalities through which the defunct company operated railway lines. The total of taxes due is \$102,769 to be paid out of \$260,470 realized from the sale of assets.

More Passengers Carried in New Jersey

627,153,013 persons were transported by Public Service Corporation subsidiaries, of whom 266,079,948 were handled by bus. Net income of railway in red, but not income of buses \$513,668

A CONDENSED summary of the results of operations of Public Service Corporation of New Jersey and subsidiary utility companies for the twelve months ending Dec. 31, 1927, follows:

Operating revenues, gross earnings.....	\$115,005,908
Operating expenses.....	\$49,035,808
Maintenance.....	11,885,135
Depreciation.....	10,084,133
Taxes.....	11,930,113
	82,935,191
Net income from operations.....	\$32,070,717
Other income.....	906,178
Total.....	\$32,976,895
Deductions (fixed charges, etc).....	18,642,579
Balance for dividends and surplus.....	\$14,334,315
Dividends on preferred stocks of Public Service Corporation of New Jersey:	
8 per cent cumulative preferred stock.....	\$1,722,496
7 per cent cumulative preferred stock.....	2,023,539
6 per cent cumulative preferred stock.....	1,286,117
	5,032,152
	\$9,302,163
Dividends on common stock of Public Service Corporation of New Jersey....	8,018,926
Net increase in surplus.....	\$1,283,237

During the last months of the year a large new engineering and construction company was formed under the name of United Engineers & Constructors, Inc., combining therein: The U. G. I. Contracting Company, Public Service Production Company, Dwight P. Robinson & Company, Inc., and Day and Zimmerman Engineering & Construction Company.

The new enterprise will be the largest of its kind in the world. Public Service Corporation of New Jersey will, hereafter, instead of owning all the stock of Public Service Production Company, own 40 per cent of the capital stock of

the new company. It is expected that the new company will execute annually a large volume of work in a manner that will result in the clients of the company receiving the best of service at the lowest cost.

There were 627,153,013 passengers carried on Public Service cars and buses during 1927, an increase of 29,822,141 over the number carried in 1926. This gain was due in part to the normal increase in traffic in the rapidly growing territory served and in part to the acquisition of bus lines from independent operators, the putting into service of new lines, extension of routes and the inauguration of lines giving a higher grade of service at a higher fare.

These various steps are in line with the announced policy of Public Service to create a co-ordinated system of car and bus transportation which will provide the kind and quality of service by street cars and buses needed to meet public requirements.

In the case of a number of street car lines of light traffic, it has been deemed advisable in the interest of economy and improved service to substitute bus service for the cars. In all such cases the results have been satisfactory.

There was established in January a charter car and bus department in charge of a general passenger agent. The result has been a substantial increase in the volume of charter bus and car business done. Special service has been operated to amusement parks, resorts, and to football games and like public gatherings. The possibilities of developing this service is indicated by the fact that on Sept. 11 as many as 109 buses were under charter.

On Oct. 28, a bus terminal for Williamstown buses, previously operat-

INCOME ACCOUNT FOR THE TWELVE MONTHS ENDED DEC. 31, 1927

	Public Service Railway	Public Service Transportation	Public Service Railroad	Other Affiliated Companies	Total
Operating revenues.....	\$18,231,215	\$14,893,121	\$291,009	\$1,954,260	\$35,369,607
Operating expenses.....	\$9,105,506	\$8,674,650	\$65,486	\$744,896	\$18,590,539
Maintenance.....	2,621,826	3,022,788	52,564	134,336	5,831,517
Taxes.....	2,052,298	820,943	48,498	166,098	3,087,839
Depreciation.....	876,962	1,617,399		167,500	2,661,861
Operating revenue deductions.....	\$14,656,594	\$14,135,781	\$166,549	\$1,212,832	\$30,171,757
Operating income.....	\$3,574,621	\$757,339	\$124,459	\$741,428	\$5,197,849
Non-operating income (exclusive of dividends of affiliated companies)...	184,938	12,684	1,226	29,030	227,880
Gross income.....	\$3,759,560	\$770,024	\$125,685	\$770,459	\$5,425,729
Income deductions (bond interest, rentals and miscellaneous interest charges).....	5,076,875	256,356	95,399	37,903	5,466,535
Net income or loss.....	*\$1,317,315	\$513,668	\$30,286	\$732,555	*\$40,805
Profit and loss accounts (excluding dividends).....	†3,910	†6,003	675		†9,238
Surplus (before dividends).....	*\$1,313,405	\$519,672	\$29,611	\$732,555	*\$31,566
Intercompany dividends.....	†324,574			324,574	
	*\$988,831	\$519,672	\$29,611	\$407,981	*\$31,566
Dividends paid unaffiliated interests (directors).....				226	226
Net increase or decrease in surplus....	*\$988,831	\$519,672	\$29,611	\$407,755	\$31,792

*Deficit. †Credit.

OPERATING REVENUE OF SUBSIDIARY UTILITY COMPANIES OF PUBLIC SERVICE CORPORATION

Year	Electric Properties	Gas Properties	Transportation Properties	Total
1918	17,587,806	14,578,269	20,831,762	52,997,838
1919	20,054,659	14,941,745	24,140,356	59,136,762
1920	23,563,929	20,872,062	27,882,095	72,318,082
1921	24,390,321	23,516,318	27,404,867	75,311,507
1922	27,660,026	23,152,426	27,544,509	78,356,967
1923	31,188,595	24,814,283	23,105,003	79,107,882
1924	34,889,632	24,542,643	28,257,177	87,689,453
*1925	40,016,174	24,181,431	30,517,918	94,715,525
1926	46,954,362	26,286,246	33,062,600	106,303,209
1927	52,393,848	27,242,453	35,369,607	115,005,908

*Change in classification of accounts effective Jan. 1.

Earnings in Kansas City Short of Agreed Limit

Earnings of the Kansas City Public Service Company, Kansas City, Mo., in 1927 fell 25 per cent below the amount permitted under the new franchise. In January, 1927, the shortage was \$14,188 and for January this year the shortage was \$45,303. For the first two months last year the shortage was \$45,028, and in a similar period of this year it was \$109,747.

According to the company it should have earned \$2,065,110 last year under the franchise allowance, while the net earnings were only \$1,611,689. Under the franchise the company is allowed to earn \$2,000,000, plus 8 per cent on additions to capital. The figures in the statement as to the capital earnings are based upon estimate of 50 per cent of the amount spent for improvements as capital expenditures.

From Jan. 1 to March 18 revenue car passengers decreased 879,836 compared with a similar period in 1927.

Denton-Terrell Operation Shows Loss

Operations of the lines of the Texas Interurban Railway, one running from Dallas to Denton and the other from Dallas to Terrell, showed a loss of \$241,720 on March 1, according to figures compiled by Richard Meriwether, vice-president and general manager of the company. The Denton line, placed in operation Oct. 1, 1924, is \$307,584 short of earning the interest charges on its notes, while the Terrell line, started Jan. 14, 1923, has earned a net income of \$65,864 in its slightly more than five years of operation.

Operating revenues of the Denton line have dropped each month since the line was placed in service, and the Terrell line has failed to earn operating expenses during the last two months. Up to March 1, the Denton line showed operating revenues of \$421,498 and operating expenses of \$493,986. The Terrell line did fairly well the first two years, but business has been poor re-

ing to the Reading ferries, and Mount Holly and Swedesboro line buses, which had previously operated to the Pennsylvania ferries, was established at the Court House, Camden. This plan met with the approval of the citizens of Camden who desired to have "the transportation package broken" in that city and provided direct connection with Pennjersey buses operating over the Camden bridge into Philadelphia.

The labor turn-over in 1927 was the lowest in a number of years. The no-accident bonus system resulted for the year in payments made to 3,871 operators, and in an appreciable reduction in the number of accidents. The system modified in the light of the year's experience will be in effect during 1928. In addition to individual bonuses, awards will be made to the men assigned to the carhouse or garage in each division which makes the best showing in reducing accidents in each of three four-month periods into which the year is divided.

During the year the Public Service Rapid Transit Railroad was organized to take over the North Jersey Rapid Transit Company, the lines of which extended from Ridgewood Junction to Suffern, N. Y.

On Dec. 31, 1927, the mileage of railway and railroad lines amounted to 878.319 miles. During 1927 single-track extension amounted to 1.066 miles; 18.101 miles of track were relaid with new rail and 2.024 miles with old rail.

Six hundred and fifty-two cars were completely overhauled, 2,288 cars received general repairs, 1,272 cars were painted, vestibule window cleaners were installed on 1,355 cars, ten improved

type snow sweepers were built, and a large amount of other work was done in the company shops.

The bus fleet was added to and improved. One hundred and fifty-six new buses for additional service and 125 new buses for replacement were purchased in addition to 146 buses bought from independent owners. Eighty-two buses were completely and 639 buses partially overhauled, 926 buses were painted, 384 bus engines were overhauled, 65 bus bodies and two wrecking cars were built in the company shops.

On August 4, 1927, the Board of Public Utility Commissioners handed down its decision upon the application of Public Service Railway and Public Service Transportation Company for the adjustment of fare zones. The petition, in which was embodied the new tariff, was handed to the commission on Dec. 13, 1926. The operation of the tariff was suspended by the board and a number of hearings held thereon. Under the order of the board, the street car and fare zones under consideration, with some modification of the tariff filed by the company, were made coincident.

\$1,562,714 Paid to City by Chicago Railway

Authorization was given by Federal Judge James H. Wilkerson to the receivers of the Chicago Railways, comprising the north and west lines, to pay to the city by April 10, \$1,562,714. This amount is the 55 per cent of the net receipts of the company due to the city under the franchise for the fiscal year ending Jan. 31, 1928.

TRANSPORTATION STATISTICS OF PUBLIC SERVICE CORPORATION

Year	Trolley Passengers	Bus Passengers	Total Passengers	Trolley Mileage	Bus Mileage	Total Mileage	Trolley Hours	Bus Hours	Total Hours	Passenger Receipts Per Trolley Mile Cents	Passenger Receipts Per Bus Mile Cents
1918	451,220,806	.....	451,220,806	54,039,150	.....	54,039,150	5,698,089	.....	5,698,089	36.00	.....
1919*	396,689,234	.....	396,689,234	57,644,927	.....	57,644,927	6,039,453	.....	6,039,453	39.29	.....
1920	543,505,154	.....	543,505,154	60,798,743	.....	60,798,743	6,539,207	.....	6,539,207	43.21	.....
1921	435,679,801	.....	435,679,801	58,309,883	.....	58,309,883	6,212,276	.....	6,212,276	44.11	.....
1922	410,212,814	.....	410,212,814	56,419,982	.....	56,419,982	5,983,122	.....	5,983,122	45.59	.....
1923	354,194,933	1,952,059	356,146,992	49,272,078	505,322	49,777,400	5,206,092	60,663	5,266,755	42.75	22.43
1924	427,828,444	76,451,240	504,279,684	53,945,515	15,704,663	69,650,178	5,662,340	1,928,498	7,590,838	41.04	26.13
1925	416,788,621	146,053,237	562,841,858	50,115,119	27,506,493	77,621,612	5,402,008	3,273,801	8,675,809	41.32	27.41
1926	397,690,308	199,640,564	597,330,872	45,632,230	36,087,475	81,714,635	4,929,558	4,013,602	8,943,160	42.88	30.05
1927	361,073,065	266,079,948	627,153,013	42,224,517	49,106,910	91,331,427	4,549,538	5,059,313	9,608,851	42.13	30.05

*Mile zone system in effect from September 14 to December 7.

MILEAGE—DECEMBER 31, 1927

First main track	527.683 miles
Second main track and turnouts	293.209 miles
Connections, crossovers, wyes and loops	11.920 miles
Carhouse and yard tracks	45.507 miles
Total	878.319 miles
Total number of passenger cars available for operation: Closed—1823	Open—277
Number of new passenger cars since 1933: Closed—1493	Open—327
Track reconstructed with new rail during 1927	18.101 miles
Track reconstructed with same rail during 1927	2.024 miles
Extensions built during 1927	1.066 miles

cently. During its operating life, up to March 1, the line showed a net operating revenue of \$440,465 and a non-operating revenue of \$15,513, or a total revenue of \$455,978. The interest charges totaled \$390,114.

Hourly service, installed when the line was started, is being maintained.

The Denton line is 38.5 miles long, the tracks of the Missouri-Kansas-Texas Railroad being used most of the distance. The Terrell line is 30.5 miles long. Both were built under terms of an agreement made when the city of Dallas awarded a new franchise to the Dallas Railway, now the Dallas Railway & Terminal Company.

Net Income in Buffalo \$100,146

Comparative income accounts for the years 1927 and 1926 have been submitted by B. J. Yungbluth, president of the International Railway, Buffalo, N. Y., to the stockholders. The figures are as follows:

INCOME ACCOUNT OF INTERNATIONAL RAILWAY YEARS ENDED DEC. 31,

	1927	1926
Passenger revenue.....	\$10,006,590	\$10,284,382
Other revenue.....	355,773	365,989
Operating revenue.....	10,362,364	10,650,371
Way and structures, equipment and power		
Maintenance.....	1,545,790	1,571,709
Depreciation and renewals	1,016,000	1,016,000
Power operation.....	2,561,790	2,587,709
Conducting transportation..	618,573	648,086
General and miscellaneous..	2,778,973	2,999,941
Taxes.....	2,212,214	2,216,135
Operation and taxes....	741,919	741,405
Operating income.....	8,913,470	9,193,276
Non-operating income.....	1,448,893	1,457,094
Gross income.....	73,247	49,799
Interest.....	1,522,141	1,506,894
Rentals.....	1,326,708	1,363,017
Amortization of discount...	46,223	46,131
Income deductions.....	49,063	49,136
Net income.....	1,421,994	1,458,284
	\$100,146	\$48,609

\$263,055 Available in San Diego for Charges and Surplus

The San Diego Electric Railway, San Diego, Cal., reports to the Railroad Commission its 1927 operating revenue at \$1,676,501 compared with \$1,667,519 for 1926. The operating expenses, excluding taxes for 1927, are \$1,381,324 and \$1,350,373 for 1926, leaving a net operating revenue of \$295,176 for 1927, and \$317,146 for 1926. During 1927 taxes charged to operation amounted to \$124,387 and for 1926 to \$113,828. Deducting the taxes leaves operating income of \$170,789 for 1927, and \$203,318 for 1926. Adding to the operating income, the non-operating income of the company and deducting non-collectible revenue and rents, results in a gross corporate income, which represents the amount available for interest, amortization of debt discount, other fixed charges, non-operating expenses, dividends and surplus of \$263,055 for 1927, compared with \$292,053 for 1926.

4 Per Cent Public Utility Bonds

PERHAPS the most vivid illustration of the downward trend in bond yields during the past few years has taken place in the list of public utility securities. Investment bankers recall that only a few years ago the ruling rates on utility bonds ranged from 6 and 7 to 8 per cent. In no other group, however, has the refunding operations into lower interest bearing issues been so rapid or extensive as among the utilities and perhaps in no other group has the intrinsic value of securities appreciated more. With many of the recent $4\frac{1}{2}$ per cent offerings now selling substantially above par, a 4 per cent coupon rate on utility bonds may not be far off. —Wall Street News.

Expansion in Maine Reported by Insull Interests

The Insull interests are negotiating for the control of the Cumberland County Power & Light Company, Portland, Me., to be merged with the Insull-controlled New England Public Service Company. The latter company operates properties in Maine, New Hampshire and Vermont.

\$973,544 Paid in Tampa for Transportation

Transportation earnings of the Tampa Electric Company, Tampa, Fla., for the year ended Dec. 31, 1927, were \$993,214 compared with \$1,279,941 for the year ended Dec. 31, 1926. According to the annual report of the stockholders 18,756,851 passengers paid \$973,544 for transportation; the revenue balance of \$19,669 came from miscellaneous sources such as special concessions, special cars and rent of equipment. Operating expenses in the transportation department were \$548,208 and transportation maintenance was \$166,613.

The company owns 158 cars and 31 buses.

The number of passengers carried, excluding transfers over a period of years, was as follows:

1916.....	10,872,102	1922.....	17,032,058
1917.....	11,107,645	1923.....	16,451,400
1918.....	11,958,831	1924.....	16,123,569
1919.....	14,247,180	1925.....	21,641,839
1920.....	15,260,820	1926.....	23,920,188
1921.....	17,224,084	1927.....	18,756,851

Nebraska Interurban to Go Out of Business

The Omaha, Lincoln & Beatrice Railway, built only to the Lincoln suburb of Bethany but with a roadbed constructed for some distance out of Omaha, is shortly to go out of existence, according to General Manager Bramlette. Although it has never paid operating expenses its owners, residents of Akron,

Ohio, were content to keep it running. Recent orders on paving by the City Council have placed a burden of cost that the road is reluctant to assume, and abandonment of the track within the proposed paving district has been asked.

Holders of Illinois Power & Light Urged to Convert Preferred

Clement Studebaker, Jr., president of the Illinois Power & Light Corporation, Chicago, Ill., in a statement made to the holders of the preferred stock of the company enclosed with the April 1 dividend checks said:

You previously have been advised of the possibility of your 7 per cent cumulative preferred stock being called for redemption at \$105 a share plus dividend accrued to date of call, and of the plan to create a new class of cumulative preferred stock to be offered in its place.

As stated, this plan is subject to the favorable action of the stockholders and the approval of the Illinois Commerce Commission. After such acceptance and approval, the call will be made.

It is gratifying to us that the 7 per cent stock has proved such a profitable investment for each of our stockholders and when definite notice of call and offer is received, we trust you will accept our offer to reinvest your funds with us in our new \$6 dividend cumulative preferred stock. Many stockholders have indicated their desire to reinvest their funds in this company, with whose affairs they have grown so familiar, and we sincerely hope you will not dispose of your 7 per cent preferred stock or make commitment for reinvestment until you have received our exchange offer.

The plan of the company to call the 7 per cent preferred stock was described in the ELECTRIC RAILWAY JOURNAL for Feb. 25, page 339.

New Director for Scioto Valley Line

Gilbert L. Fuller has been elected a member of the board of directors of the Scioto Valley Railway & Power Company, Columbus, Ohio, to fill the vacancy caused by the death of the late F. R. Huntington, Columbus banker.

Defunct Material Taken Over in Olean

The city of Olean, N. Y., will take over the bridges, real estate, power lines and tracks of the defunct Olean, Bradford & Salamanca Railway, within the city limits, on or before May 1. The compromise has been agreed upon between the receivers for the company and city officials following a year's litigation.

At the time the railway suspended operations it was in arrears more than \$10,000 in city taxes and in excess of \$26,000 in paving assessments.

In the summer of 1927 Supreme Court Justice Noonan issued an order authorizing the receiver of the Olean, Bradford & Salamanca Railway to discontinue operation of the interurban line between Bradford, Pa., and Salamanca, N. Y., and scrap the properties.

Legal Notes

CALIFORNIA—Duty of Person Driving Automobile on Car Track.

While a person who is driving a vehicle along or in close proximity to a car track is not bound to keep a constant watch behind for approaching cars, it is his duty to turn off the track when he sees or hears a car approaching from the rear, or could see or hear it by the exercise of reasonable care. He should listen for signals of approaching cars and should heed any that he may hear. [Berguin vs. Pacific E. R. Co. 263 P., 220.]

FEDERAL CIRCUIT COURT—Jurisdiction of Federal Court Should Be Liberally Exercised. Duration of Grants Without Time Limit.

When the jurisdiction of a federal court is called in question, the subject should be construed liberally so that the case in point may be indubitably heard and determined. When acting in a proprietary capacity, a city is subject to many of the same restrictions as a private individual. Where grants by a city of right-of-way to a street railway are unlimited as to duration and contain the power of assignment, the grants are without time limit in the absence of constitutional or statutory limitations. [City of Denver vs. Denver T. Co., 23 F. (2d), 287.]

ILLINOIS—Commission Cannot Grant Certificate to Competing Company When Existing Service Is Adequate.

Overwhelming testimony indicated that the service a bus company was giving was adequate. A competing company received a certificate because it offered a longer route. It was held that that the commission could require additions to and modifications of the service of the existing company, but could not refuse to renew its certificate if it was willing to make these changes. [Wilcox Transportation Co. vs. Commerce Commission, 159 N.E. 788.]

MASSACHUSETTS—Street Railway Is Liable for Injuries Caused by Improper Removal of Snow From Its Tracks.

A street railway has the right to remove snow from its tracks, but it is bound to exercise reasonable care and diligence in doing so, and if it negligently produces an obstruction rendering traveling unsafe, it is liable for injuries caused thereby. [Graul vs. Boston Elevated Railway Co., 159 N.E., 606.]

NEW YORK—Operation of Motor Bus Without Authority Does Not Preclude Recovery for Injury to Bus in Collision.

A motor bus in New York was operating under a permit from the Department of Plant and Structures of the city,

but the Public Service Commission had not given its approval to the operation so that the bus was illegally carrying on the business of a common carrier of passengers. This violation of the statute, however, had no direct connection with the injury which it suffered from a collision. The illegality consisted not in the operation and use of the streets by the bus, but in the carrying of passengers for hire. It is only in the case where a violation of a statute or an ordinance has such a direct connection with the injury which has been received as to form and be a part of the act causing the injury that the law bars recovery for the injury received. Moreover, the statute governing the licensing of common carriers prescribes penalties for failure to comply with them. The courts must not add other penalties. It cannot be said that the bus, within the meaning of the law, was a public nuisance and interfering and obstructing the streets when it was legally on the streets, although used for an unauthorized purpose. Hence, when a street car negligently injured such a bus in a collision, the railway company was responsible. [Klinkenstein vs. Third Avenue Ry., 158 N. E., 886.]

NEW YORK—Power of Railway Company to Control the Union Affiliations of Its Employees Is Defined.

This was a suit of injunction brought by the Interborough Rapid Transit Company against E. P. Lavin individually and as president of a union to prohibit him and other defendants from inducing the company employees to leave its employ. It also asked damages for acts during the strike in July, 1926. As a result of that strike the defendants were discharged from the employment of the company. The court held it could act in labor disputes only where there was a probability of unjustified interference with the company's rights. It held that the company could determine for itself the conditions of employment on its railway which will best assure the interests of public and company, provided it can induce sufficient workers to accept these conditions. It may refuse to employ workers who will not make an agreement that they will not join a particular union or combination of workers while in the company's employ. The company claimed that it had done this when it had accepted the constitution of a brotherhood of its employees, one of whose rules obligated its members not to become identified in any manner with the Amalgamated Association, or any other association of street railway or other employees, with the exception of the brotherhood, and that a violation of this agreement would constitute cause for dismissal from the employ of the company. The court held that this condition did not necessarily imply a binding contract between the company and

each individual employee, as the parties directly concerned were the brotherhood and the employees. Efforts of the defendants to instigate a strike while in the employ of the company or to recruit members for the Amalgamated Association after they had left the company's employ are not necessarily unlawful acts, though they may be so. Extracts from this portion of the decision were published on page 92 of the issue of this paper for Jan. 14, 1928. In the belief that the original injunction was too broad, the Court of Appeals remitted the motion to the special term, so that it might exercise its discretion as to whether an injunction of more limited scope should issue upon the facts contained in the record. [Interborough Rapid Transit Co. vs. Lavin et al. 159 N. E. 863.]

OHIO—Stoppage of Automobile on Wrong Side of Street Except Because of Emergency or Some Regulation of Law Is Negligence per se and Not Prima Facie Negligence.

While an automobile was crossing a bridge over a steam railroad, smoke from a passing train partly obscured the roadway and to avoid it the driver turned to the left-hand side of the road where he was struck by a trolley car. In the trial court the judge read to the jury sections of the general code which forbade a driver to obstruct the left-hand side of the road except "by reason of other lawful regulations or emergencies." Judgment for the plaintiff was reversed in the Court of Appeals on the ground that this action gave the jury the impression that the action of the driver was justified. It was not, as there was no such emergency. Violation of a statute is negligence per se and not prima facie negligence. [Cleveland Ry. vs. Kuncic, 159 N.E., 96.]

TEXAS—Injury to Automobile Guest Where Motorman Discovers Peril After Driver's Negligence.

In a personal injury action against an automobile driver and a railway company by an automobile guest, the jury found the railway was negligent after the peril was discovered. This was held not to affect the error of the trial court in refusing to submit to the jury the issue whether the automobile driver's negligence in failing to keep a lookout was not the sole proximate cause of the injury. [Northern Texas T. Co. vs. Woodall et al., 299 S.W., 220.]

WYOMING—Grant by Commission Subject to Change by State.

A certificate of public convenience and necessity, issued to a transportation company, may be altered later as it is subject to a reasonable exercise of the state's police power. Anyone attacking a statute as unconstitutional must point out the specific constitutional provisions claimed to be violated and show that the statute is unconstitutional as to himself, not merely that it is unconstitutional as to other persons or classes. [Salt Creek T. Co. vs. Public Service Commission, 263 P., 621.]

Personal Items

Frank Pick of London Honored

Frank Pick, formerly joint assistant managing director, of the Metropolitan District, London Electric, City & South London, and Central London Railways, and the London General Omnibus Company, has now become managing director.

In 1902 he entered the service of the North Eastern Railway under Sir George Gibb, then general manager, and worked successively in the statistics office, district superintendent's offices at Sunderland and Newcastle-on-Tyne, the rates offices and, finally, in the general manager's office. In 1906 he removed to London with Sir George Gibb when Sir George took over the management of the Metropolitan District and London Electric Railways. Upon Mr. Gibb's retirement in 1907, Mr. Pick was transferred to the staff of A. H. Stanley, now Lord Ashfield. He was born at Spalding in Lincolnshire in 1878. He was educated at St. Peter's School, York, and was later articled with George Crombio, solicitor, York. In 1902 he qualified as a solicitor and in 1903 became L.L.B. (London University).

C. E. Morris in Toledo

Coincident with the announcement of plans to speed up the service of the Community Traction Company, Toledo, Superintendent Forsgard made it known that C. E. Morris, until recently schedule engineer with the Cleveland Railway, Cleveland, Ohio, has been named superintendent of schedules for the Community Traction Company. Mr. Morris previously had considerable experience in schedule work for the United Railways & Electric Company of Baltimore. He is making a study of the schedules on a number of lines other than the Cherry Hill one, on which changes have been made, and similar plans for bettering service on other lines are to be announced soon.

"Goofy" Complaints in Omaha Investigated

The difficulties of pacifying railway employees and patrons in Omaha, Neb., were recounted in the March 11 issue of the *Omaha Bee-News* in an interview with William C. Baughman, the new head of the newly-established complaint department of the Omaha & Council Bluffs Street Railway. Mr. Baughman tells about the wailings of the woman who tore her sheer hose and the argument of the defiant motorman who just wouldn't let a passenger open the window on a freezing night. He at one time piloted one of the cars on the Dundee line. After serving as trainman for eight years he spent eight more years in the lost and found department and the claim department. He hasn't much

time to complain himself—he's so busy adjusting the troubled affairs of others. When President Shannahan moved to Omaha he announced that every deficiency in the service had to be eliminated and this complaint department is part of this idea. But Mr. Baughman says "we don't think much of the ordinary knockers, the folks who write in and tell us what is wrong with the service, but refuse to sign their names." He adds that where the complaints were merited additional service had been installed as a result of their reception.

Official of Binghamton Railway in City Post

Vine W. Burley, superintendent of the Binghamton Railway, Binghamton, N. Y., is a railway official who has given serious heed to the admonition of the soothsayers of the electric railway



V. W. Burley

industry that men engaged in railway work shall do something for communities other than just run their railroad, no matter how well they may do that. In consequence, ever since Jan. 1 Mr. Burley has been commissioner of public work of Binghamton, to which office he was appointed on Jan. 1 by Mayor-elect Norman A. Boyd.

It is said that at first Mr. Burley doubted his ability to serve two masters successfully, but if he did have any doubts his mind was relieved of them by William H. Riley, receiver of the railway, who would not listen to the idea of the railway losing so competent an official. As a result the city is happy, Receiver Riley is happy, and the employers of the Binghamton Railway are happy—and Mr. Burley is happy, but busy. Not only is Mr. Burley getting lots of different kinds of experience in his city post, but he is enjoying the work. He spends certain hours each day with the railway, and it is perhaps not without the pale and in accordance with facts to say that he really likes his work with the railway better than he does that with the city.

In announcing his selection of Mr.

Burley, Mayor-elect Boyd said the appointment was a purely personal one and had been made without reference to politics, as he had not inquired whether Mr. Burley was a Republican or a Democrat. The Mayor said:

I have chosen Mr. Burley because I believe him to be well qualified for the important position he is called upon to fill, and that the best interests of the taxpayers will be served in making this appointment.

Mr. Burley is a man of wide experience in handling men, has held responsible executive positions in the past and is possessed of ability that will prove of great value to the taxpayers.

Certainly the Mayor appraised him correctly when he said Mr. Burley would aim to operate the department of public works on a practical basis and give the taxpayers full value for money expended.

Mr. Burley was born in Mills, Pa. He worked his way through Cayuga College, graduating with the highest honors in his class. He became associated with the Pennsylvania Railroad and rose to a position that gave him charge of the engineers and firemen on that road. His headquarters were in Philadelphia, and he was connected with the road for ten years, leaving Philadelphia seventeen years ago to go to Binghamton as superintendent of the Binghamton Railway.

Obituary

Dr. Delos F. Wilcox

Dr. Delos Franklin Wilcox, franchise and public utility authority, author and lecturer, died of pneumonia on April 4 in New York after a brief illness. In his practice as a public utility expert he advised many cities on franchise, rate and valuation matters. Dr. Wilcox was much in the public eye in connection with this work, but was probably most widely known for his advocacy of municipal ownership and for his book in two volumes "Municipal Franchises." Dr. Wilcox was also the author of many shorter treatises on municipal problems. His writings were noted for their clearness and the force with which he presented his ideas.

Born in 1873 near Monroe, Mich., Dr. Wilcox was educated at the University of Michigan and Columbia University, receiving the degree of Ph.D. from the latter. For some years he was engaged in work relating to improved city government, first in Cleveland and later at Grand Rapids and Detroit.

In 1907 he came to New York to become chief of the bureau of franchises of the Public Service Commission for the First District, which was then being organized. He resigned in 1913 to enter private practice as a public utility expert. In 1914 he was appointed deputy water commissioner of the City of New York by Mayor Mitchel. He resigned from this post in 1917 to resume his private practice. In 1919-20 he acted as adviser to the Federal Electric Railways Commission.

Manufactures and the Markets

Employment Situation Basically Sound

Surveys by government departments and others indicate less unemployment than some persons have intimated. A great readjustment in industrial employment is taking place

By JULIUS KLEIN

Director Bureau of Foreign and Domestic Commerce

IN ESTIMATING the present situation there seems to be a prevailing tendency simply to take statistical soundings as to the depth of the business stream at random spots, with only an occasional effort to gage the force and direction of its current, its general trend, whence it has come and whither it is carrying our commercial and industrial crafts—and at what speed. After all, the outstanding feature of our business life is its extreme mobility.

The type of queries as to current conditions which are now coming to the Department of Commerce—and our inquirers now number 10,300 a day on the average—indicate certain definite shortcomings of our present business statistical apparatus. In the first place, there is entirely too much of it; at least the average merchant or industrialist who hasn't a staff of business analysts in his own business organization seems to think so. He feels the necessity of having segregated for him a few outstanding figures of prime utility for his purposes. This task of selection is clearly one in which his trade association and business papers can be of immediate and special help. The business community no longer wants "bigger statistics," but better ones. Secondly, our correspondents complain of a persistent tendency to overwork available figures.

Thirdly, on the major problem of unemployment, we are clearly behind Europe in the accuracy of our statistical data. It is most gratifying that the Department of Labor has undertaken an authoritative study, and it is hoped that it may lead to a systematic check of this highly important problem.

A characteristic instance was in the case of the Baltimore figures, which were given at the outset as 70,000 by one group of advocates, subsequently as 36,000 by another agency, whereas the actual house-to-house count by the Department of Labor revealed only 17,000.

A fourth weakness in our business figures, as currently interpreted, has been revealed in miscalculations in some quarters based upon the returns from chain stores and mail order houses. The increasing gross returns from these sources have been taken to indicate improved buying power in spite of the clearly evident factor that in each case the number of stores involved has been notably increased. If deductions are made for this factor, the returns in the main do not indicate any *relative* increases in business.

Broadly speaking, there are just a few

outstanding figures which, for current average use, seem to be of special value. The trend of electrical energy consumption offers a decline gage in a wide range of industries. Incidentally, the February figures, as tabulated by the McGraw-Hill Company, indicate a substantial increase over February of last year for every industrial group with the exception of lumber. In some cases

the gain is unusually high—nearly 42 per cent in the case of rubber, nearly 40 per cent in automobiles, nearly 29 per cent in stone, clay and glass, more than 26 per cent in metal working plants, 21 per cent in rolling mills and steel plants, and 18.5 per cent in chemical and allied products.

Another figure, which seems to be getting wider currency, is that of the Department of Commerce on building contracts, as distinguished from simply permits. Here again the figures are encouraging, running 10 per cent higher during the first ten weeks of 1928 as compared with a year ago. Indeed, in residential building the figures of the first two months of this year are 32 per cent over 1927.

Inventories are also being more and more widely used as a ready clue to the actual mobility of demand. Here, the situation in mid-March is not at all discouraging. Of course, from the point of view of the manufacturer the increas-

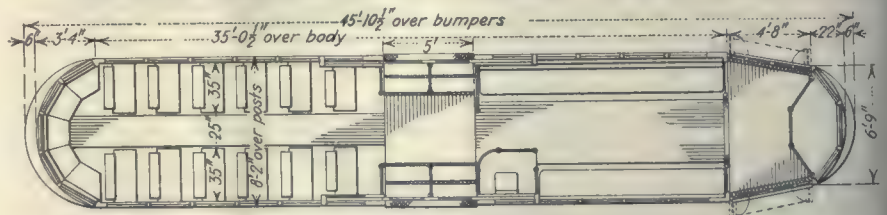
Twenty Units Delivered to Mexico Tramways

Twenty cars for the Mexico Tramways, Mexico City, Mexico, have been delivered by the J. G. Brill Company, Philadelphia, Pa. The cars are of the

two-man, single-end type. They weigh 38,950 lb., are 45 ft. 10½ in. long and are arranged for pay-as-you-pass fare collection. They seat 49 passengers.



One of the twenty units delivered to the Mexico Tramways Company



Floor plan of the New Mexico City cars

Name of Railway	Mexico Tramways
City and State	Mexico City, Mexico
Number of units	20
Type of unit	Two-man, motor, passenger, city, single end
Number of seats	49
Builder of car body	The J. G. Brill Company
City and state	Philadelphia, Pa.
Date of order	May 27
Date of delivery	October 27
Weights: car body	19,625 lb.
Trucks	11,935 lb.
Equipment	7,390 lb.
Total	38,950 lb.
Bolster centers	23 ft. 3½ in.
Length over all	45 ft. 10½ in.
Length over body posts	35 ft. 0½ in.
Truck wheelbase	4 ft. 10 in.
Width over all	8 ft. 4 in.
Height, rail to trolley base	10 ft. 11½ in.
Window post spacing	2 ft. 5 in.
Body	Semi-steel
Roof	Arch
Doors	Center-exit, end-entrance
Air brakes	General Electric
Armature bearings	Plain
Axles	A.S.T.M. annealed
Car signal system	Faraday buzzers
Compressors	CP-28-D
Conduit	Metal
Control	Type K
Couplers	Brill self-supporting radial
Curtain fixtures	Curtain Supply Company

Curtain material	Pantasote
Destination signs	Hunter
Door mechanism	National Pneumatic
Doors	Folding-end, sliding-center
Fare boxes	Cox
Finish	Enamel
Gears and pinions	General Electric Grade M
Glass	D.T.A.
Hand brakes	Brill
Hand rails	Aluminum
Headlights	Crouse-Hinds
Headlining	Agasote
Interior trim	Cherry-stained and aluminum
Journal bearings	Plain
Journal boxes	Brill
Lamp fixtures	General Electric
Motors	Four G.E.-275A, outside hung
Painting scheme	Durban red
Roof material	Canvas
Safety car devices	Door interlock
Sash fixtures	National Lock Washer Company
Seats	Brill
Seat spacing	2 ft. 4½ in.
Seating material	Cherry slat
Steps	Front-folding, center-stationary
Step treads	Feralun
Trolley catchers	Earle
Trolley base	U. S.-13
Trolley wheels	General Electric No. 48
Trucks	Brill 76-E-1
Ventilators	Brill exhaust type
Wheels, rolled steel	28 in. diameter
Wheelguards	Root lifeguard

ing tendency toward hand-to-mouth buying, which is in part the explanation for the prevailing favorable low position of inventories, is not an altogether attractive indicator.

Two commodity figures, which are less widely used but which offer attractive possibilities as definite indicators, are the trends in consumption of machine tools and of office appliances. These are both rather definite indices of the readiness of the manufacturer and merchant to back up their judgment as to the outlook with concrete preparations.

In addition to these factors there are, of course, the basic ones of the availability of credit and the conditions in such major industries as automobiles and steel. Automobile production, exclusive of the Ford operations, is now more than 33 per cent over figures for the corresponding period of 1927.

March operations in iron and steel continued at the February rate of 85 per cent compared with 91 per cent a year ago. Price advances are being maintained and the prospects continue favorable.

The trend of our imports is also being noted by competent observers as a useful index of the growing demand for raw materials. February imports exceeded \$353,000,000, which was 13.5 per cent larger than February, 1927, though, of course, it must be remembered that there was one more day in the month this year.

With reference to the unemployment situation, precise figures are not available at this writing, but preliminary indications are that the totals revealed on the basis of accurate samplings now being taken in various districts will be very materially below the estimates of recent weeks. As Secretary Davis quite properly pointed out, three-quarters of a million, even a million, unemployed is a more or less normal feature of any such vast industrial area as the United States, particularly at this seasonal turn of the year. Our real objective should be the elimination of surplus employable labor.

Much of the recent situation was quite evidently seasonal, and even more of it was sharply regional. The tendency of all too many casual observers was to generalize on the basis of momentary local observations. Fundamental variations are constantly going on, not only as among different regions at any one time, but also in any one region over a period of seasons. This obvious truism seems to have been overlooked by some current observers.

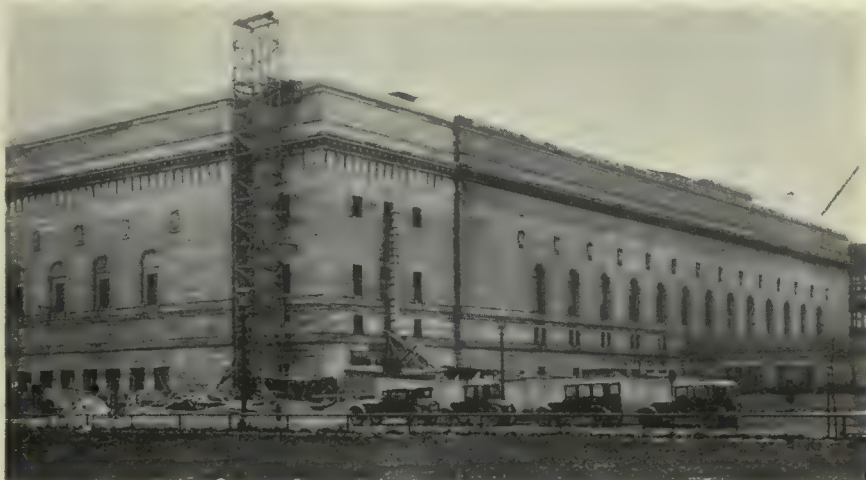
The shrewdest perception of our most erudite counsellors has revealed no one panacea for this situation, not even the rigid maintenance of a high wage scale. Invaluable though that factor is as a rule, it can on occasions be carried to disastrous extremes. One of the most helpful contributions toward the alleviation of this regrettable accompaniment of every profound industrial evolution such as ours, was that recommended by Secretary Hoover at the time of the Unemployment Conference in 1921. At

that time he urged the "accurate study by civic bodies of the character of the industries in their respective centers in an endeavor to discover opportunities for integrating industries to intermesh with each other in the reduction of seasonal idleness." Another corrective which is

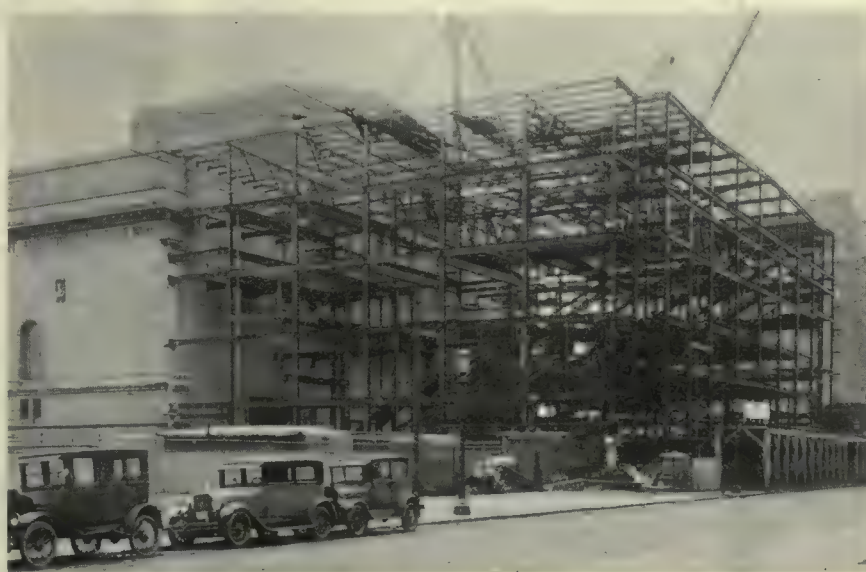
now very much to the fore is the allocation of public works to the slump periods in the employment curve.

One of the inevitable costs of our progress in waste elimination and in more efficient protective methods has been the displacement of labor. This

Space Applications for A.E.R.A. Show Ready



The Lakeside Avenue side of the Cleveland Public Auditorium, which is almost completed. It contains lobby accommodations, restaurant, lounge, meeting room and a grand ball room



When the St. Clair Avenue side of the auditorium is finished it will have facilities for two theaters

Applications for show space at the 47th annual gathering of the American Electric Railway Association, to be held in Cleveland from Sept. 22 to 28, inclusive, will be mailed to all members on April 14. The Cleveland show will open promptly at 9:00 a.m. Saturday, Sept. 22. All applications received up to the close of business May 14, will be awarded space by the exhibit committee, which is scheduled to meet May 16 to make the official allotment. If any space remains unsold after the initial allotment has been made, it will be assigned by the director of exhibits, in the order in which applications are received.

Exhibits will occupy both floors of the Cleveland Auditorium as well as the entire annex. The two buildings are connected with a covered passageway in which there will be operating maintenance-of-way exhibits. Track space for the display of street cars will also be provided.

Railway material, cars, buses and bus accessories, shop tools, garage equipment, etc., will be shown, as well as many other items pertinent to the transportation industry. An unusually large and varied display is expected. Last year there were 293 exhibiting companies and a total of 8,024 delegates.

development, plus the deflation of our wartime industrial abnormality, has resulted in a net decrease in employees in our factories of something like 917,000 since 1920. This substantial figure, if added to the 800,000 represented in the decline of employees in agriculture and the 240,000 relieved from the railroads since the war, gives a formidable total of displaced labor of nearly two millions.

There has, however, been a most helpful corrective, which has taken up most, though perhaps not all, of the slack, namely the astonishing increase in non-manufacturing pursuits. For example, since 1920 there has been an increase in the number of workers in automobile servicing and distribution of nearly 760,000. There are nearly 100,000 more insurance agents clamoring at our doors today than in 1919. Another 100,000 increase is estimated in the service employees of electric refrigeration, light and power, and oil heating establishments. The management, servicing, and general direction of construction accounts for an increase of another 100,000 in the same time. There are 232,000 more teachers and professors required today than in 1919. The increase in motion picture servitors, exclusive of production, accounts for another 125,000 added to the cinema industry since the war. It is not hard to explain the increase of 170,000 barbers and hairdressers during the same time. Service personnel of hotels and restaurants has increased by 525,000.

All of this is offered as by no means an attempt to dispute the perfectly evident fact that there is unemployment, perhaps in greater quantity today than for some months past. It is offered solely as one phase of the employment situation which is apt to be overlooked, and without which any observations upon the over-capacity of industries, or the alarming deflation of our factory payrolls through greater efficiency, simply cannot be properly understood.

The first and indispensable safeguard of our prosperity is to minimize waste, to concentrate every possible individual exertion toward widening the present rather narrow margin of profit by cutting in on production cost on the one hand and the expenses of distribution on the other. Our chief task in the future seems to lie in further economies in distributive effort. The volume of output, however, economically achieved, is of no ultimate value whatsoever in our operations without a corresponding volume of profit to the manufacturer.

Root Snow Scrapers for Holland

The Noord-Zuid-Hollandsche Tramweg Maatschappij, Haarlem, Holland, has ordered from the Root Spring Scraper Company, Kalamazoo, Mich., two No. 1 and two No. 8 snow scrapers.

An order for 38 Root life-guards has also recently been received from Pittsburgh. The 125 cars recently shipped to Detroit and the twenty cars shipped to the Mexico Tramways, Mexico City, were equipped with Root life-guards.

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

Metals—New York		April 3, 1928
Copper, electrolytic, cents per lb.	14.00	
Copper wire, cents per lb.	16.125	
Lead, cents per lb.	6.10	
Zinc, cents per lb.	6.075	
Tin, Straits, cents per lb.	53.375	
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	4.15	
Somerset mine run, f.o.b. mines, net tons.	1.875	
Pittsburgh mine run, Pittsburgh, net tons.	2.00	
Franklin, Ill., screenings, Chicago, net tons.	1.825	
Central, Ill., screenings, Chicago, net tons.	1.675	
Kansas screenings, Kansas City, net tons.	2.375	
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	15.30	
Weatherproof wire base, N. Y., cents per lb.	16.5125	
Cement, Chicago net prices, without bags.	2.05	
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.00	
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.25	
Turpentine (bbl. lots), N. Y., per gal.	\$0.635	

Northwestern Pacific to Improve

Northwestern Pacific Railroad, San Francisco, Cal., has been ordered by the California Railroad Commission to undertake immediately, and to carry out to consummation with all reasonable diligence and expedition a program of improvements of its service and facilities. The decision is the result of extensive hearings conducted by Commissioner Leon O. Whitsell, and embodies the program of improvements proposed by the engineering department of the commission, and agreed to in the main by the defendant corporation during the progress of the hearings.

In the program of improvements, the railroad was ordered to construct, in accordance with plans to be approved by the Commission, new stations at Union Station, B Street Station and West End Station, San Rafael, Marin County, Ukiah, Mendocino County, and Healdsburg, Sonoma County and reconstruct or improve, in accordance with plans to be approved by the Commission, its stations at Sausalito, Tiburon, Mill Valley and Ross, as well as maintain a reasonably high standard at other stations on its line. It is to construct, in accordance with plans to be approved by the Commission, shelter stations on the west side of the track at Almonte, Baltimore Park and Kentfield and to file with the Commission, for its approval, within three months from the date of the order, a plan providing for the elimination of the hazard of third rail operation on Second Street, San Rafael, and upon the approval of the Commission the company shall have such plan put into effect as expeditiously as possible. The third rail is to be protected with a covering at all stations and throughout the entire territory traversed by the line, except that if the company so elects, such third rail covering may be omitted in marsh territory on that portion of the line between Pine Street, Sausalito, and Almonte and between Almonte and west end of Corta Madera Tunnel, between Baltimore Park and Green Brae and between California Park and San Rafael, except at station grounds. Protective covering for third rail contact shoes and other exposed energized surfaces on all interurban equipment is also to be made. The company must submit for the

Commission's approval, within three months from the date of the order, a plan of improving the service on its San Geronimo Valley line and proceed to carry out all the recommendations with respect to improving grade crossings. It is ordered to carry out all the recommendations with respect to correcting impaired clearances and unsafe conditions in tunnels and on bridges, to proceed to improve the power situation on its lines substantially in accordance with the recommendations in the Commission's exhibit No. 2 and to submit, for the Commission's approval, a plan of renewing equipment and to promptly proceed to purchase and place in operation five new motor cars and five new trailer cars, of a detail design to be submitted to the Commission for approval within three months.

ROLLING STOCK

NEWBURGH PUBLIC SERVICE CORPORATION, Newburgh, N. Y., successor to the Orange County Traction Company, lost all but one of its fleet of 21 buses on March 30 in a fire which destroyed its garage and contents. It is understood that an order is being placed for fifteen buses to replace this equipment.

WASHINGTON RAILWAY & ELECTRIC COMPANY, Washington, D. C., has received four new double-end one-man cars from the J. G. Brill Company. These cars are the first of an order of twelve, at a total cost of \$160,000.

TRACK AND LINE

TRENTON & MERCER COUNTY TRACTION CORPORATION, Trenton, N. J., will erect a new railroad crossing at State and Canal Streets.

SPRINGFIELD STREET RAILWAY, Springfield, Mass., is preparing for rehabilitation work from Holly Street to Oak Street, Indian Orchard, at a cost of approximately \$17,000; special work at the corner of Main and Oak Streets, Indian Orchard, at a cost of about \$6,000; and on White Street from Orange Street to Sumner Avenue at a cost of approximately \$19,000.

TRADE NOTES

STANDARD AUTOMATIC SIGNAL CORPORATION, Chicago, Ill., has appointed Frank J. Lepreau as sales manager. Mr. Lepreau was formerly Chicago representative of the L. S. Brach Manufacturing Company, Newark, N. J.

IDEAL COMMUTATOR DRESSER COMPANY, Sycamore, Ill., has appointed Syracuse Supply Company, Syracuse, N. Y., as exclusive sales representative in the Syracuse territory.

W. P. BROWN & SONS LUMBER COMPANY, Louisville, Ky., has moved its creosoting department to Fourth and K Streets, Louisville.



Positive—

“Peacock” Staffless Brakes are always *positive*. No matter how much chain comes in, they’ll wind it up and set the brakes with all the power necessary.

There will be no alarmed passengers or frightened, helpless motorman, when the unexpected emergency is encountered, if cars are equipped with the “Peacock” Staffless.

Don’t trust your passengers’ safety to inferior handbrakes. Specify “Peacock” Staffless and be positive there will be no inroads on accident reserves on that score.



The
“Peacock”
Staffless

National Brake Co., Inc.

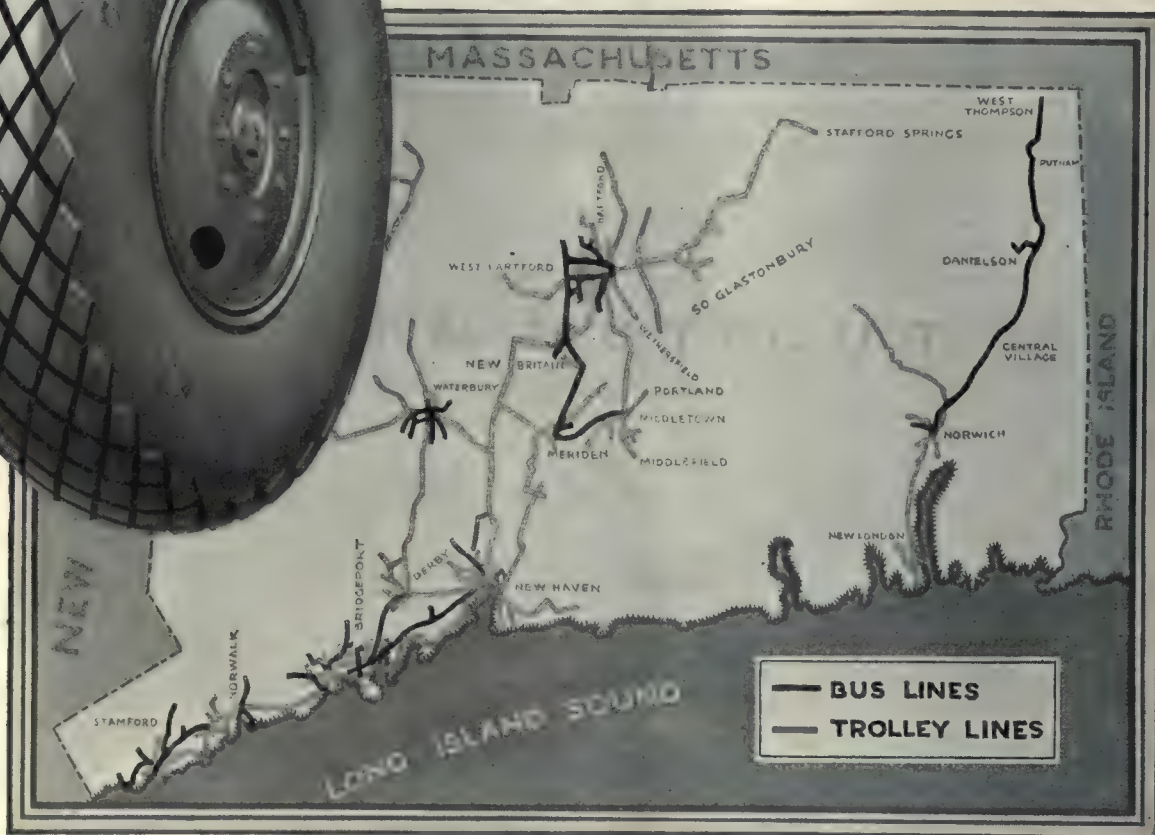
890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative

Lyman Tube & Supply Company, Limited, Montreal, Canada



Thousands of low-cost miles on Goodyears



Map showing the bus routes and trolley connections of The Connecticut Company; inset photograph of a Goodyear Pneumatic Cord Bus Tire

THE reason Goodyear Pneumatic Cord Tires are so greatly preferred in motorbus service the country over is found in Goodyear tire construction.

First there is the All-Weather Tread. The sharp, thick, diamond shaped blocks of this famous tread cut through snow, slush, mud and slime to solid footing, and they hold that footing securely.

There is powerful traction and there is great security in the All-Weather Tread.

The body of the Goodyear Tire is made of SUPERTWIST, the extra-elastic, extra-durable cord that flexes and recovers resiliently, eliminating shoulder breaks and other causes of blowouts.

There is extra dependability in Goodyear SUPERTWIST construction. There is freedom from trouble. There is uninterrupted, low-cost, revenue mileage. There is an easy riding quality the passengers appreciate.

These are the reasons for the 100% Goodyear equipment on such lines as The Connecticut Company.

The 128 motor coaches of this Company average 350,000 miles a month, all on Goodyear Tires.

The records of Goodyears in this service are replete with instances of Goodyear Tires standing up for 22,000 to 28,000 miles.

If you want efficient, economical tire performance for your service, equip with Goodyear.

GOODYEAR

Why Guess at Bus Profits



Reo busses—proved by millions of miles of use—are built to take the guesswork out of bus operation.

For Reo busses have two outstanding advantages—Greater Mileage Output and Low Maintenance Cost.

The 6-cylinder power and 4-wheel brakes of Reo busses will give you more miles per working day—as much as 23% more miles, to cite only one instance.

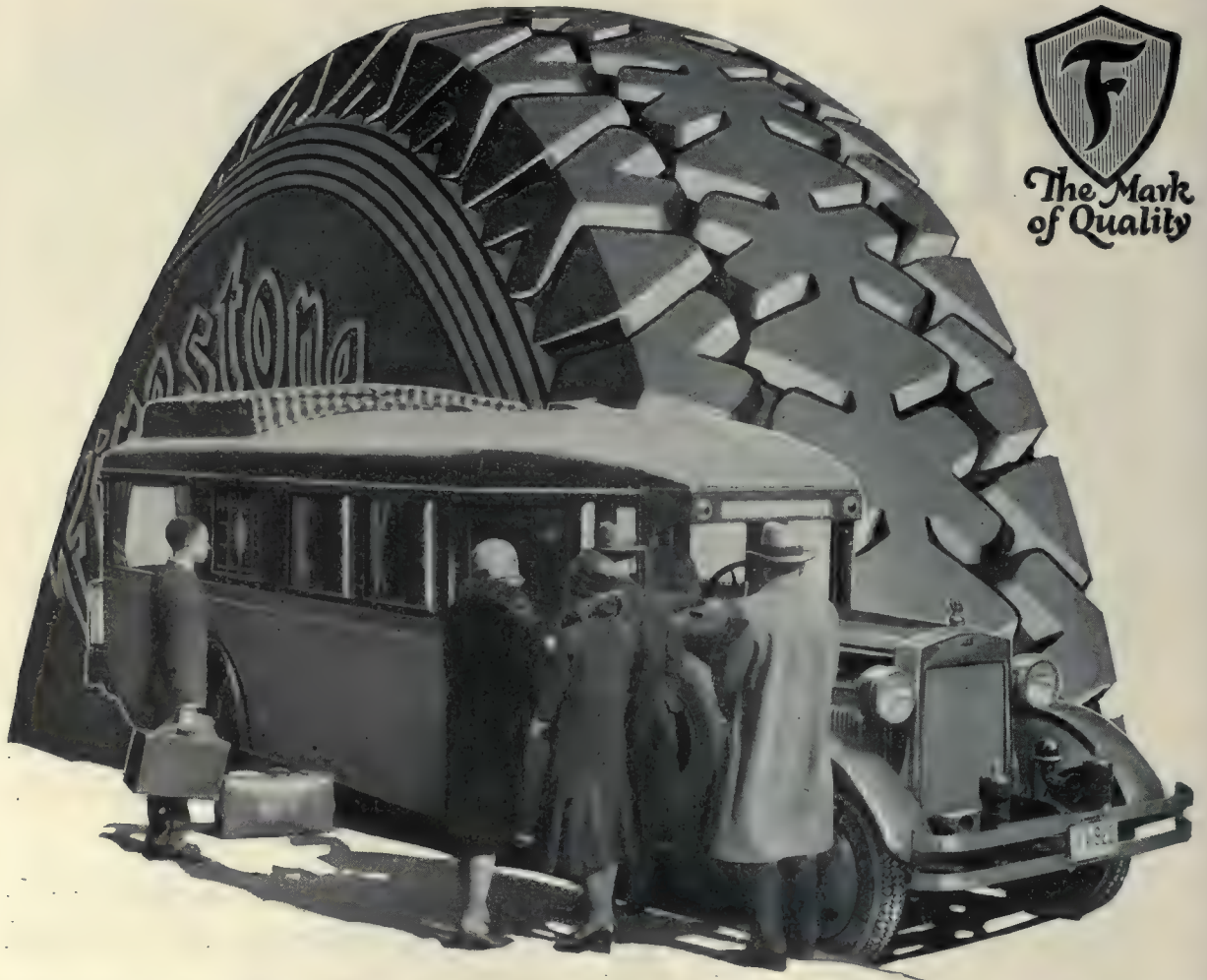
Amazing figures—available on request—show that Reo busses cost you less to maintain and that their depreciation is remarkably small.

Constant improvement and a multitude of new mechanical features make Reo busses a safer investment for the bus line operator who wants to know where he is going. Try one out today.

12
AND
21
PASSENGER

REO MOTOR CAR COMPANY, *Lansing, Michigan*

REO BUSES



EFFICIENCY and ECONOMY all along the line

From Coast to Coast the operators of the largest bus fleets are standardizing on Firestone Gum-Dipped Tires.

Why are these leading bus operators obtaining greater operating efficiency and lower tire costs? This is not only a matter of better tire equipment, especially engineered by Firestone for bus requirements—but it carries definite assurance of a most complete service program organized at convenient points by Firestone factory trained men. Firestone pioneered in the development of the motor bus industry.

Firestone co-operated from the start with leading operators and manufacturers.

Firestone leadership in bus tire design *plus* this broad experience in service is helping hundreds of bus lines to keep abreast of traffic demands, maintain on-the-minute schedules and show constantly decreasing cost-per-tire-mile. Your local Firestone Dealer will gladly explain to you the Firestone Bus Tire Proposal of Service. Call on him today, or write to the Home Office at Akron.

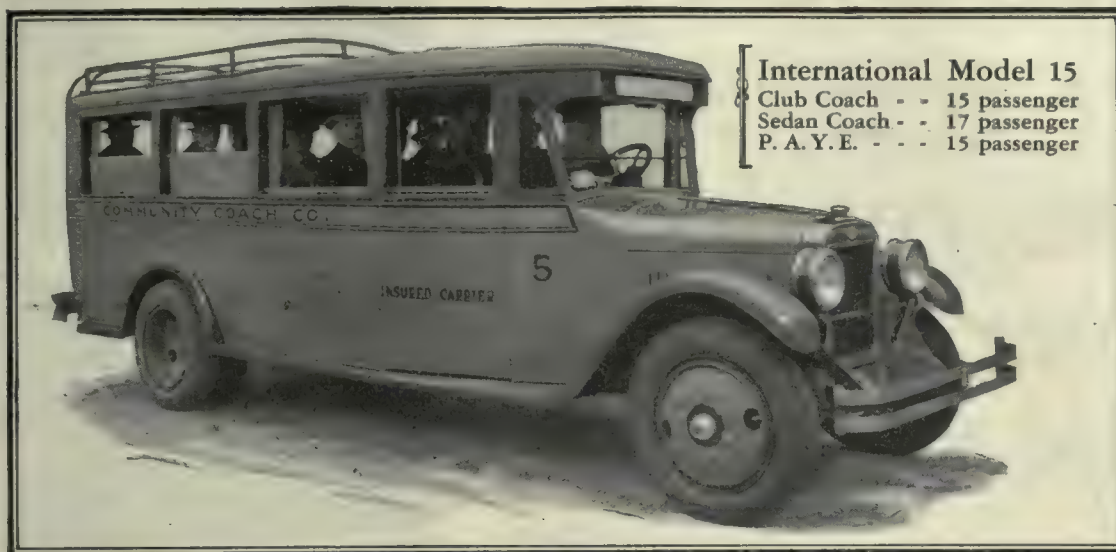
MOST MILES PER DOLLAR

Firestone

GUM-DIPPED TIRES

AMERICANS SHOULD PRODUCE THEIR OWN RUBBER...

Harvey S. Firestone



International Harvester *Six-Cylinder* COACHES

THE International line of motor coaches fits the practical requirements of every community.

Backed by long experience, these modern coaches are unexcelled in mechanical design, beauty, and comfort; unequalled in safety, and in service facilities. Coach traffic men know this. They know that International Coaches are a profitable investment. Experience has shown them that when an International is put on the job it stays on the job—and does the work so well that vehicle problems and operating costs are settled for years. No wonder you see so many International



Coaches wherever you go!

Careful study and understanding of coach route requirements has resulted in the development of the Model 15, which has won the esteem of coach operators everywhere. This 6-cylinder

coach is available in three styles—Street Car Type, Club Coach, and Sedan; generously built to carry 15 or 17 persons—the practical capacity. Our new catalog will acquaint you with the many exclusive refinements offered by International Harvester *Six-Cylinder* Coaches. Copies are available by writing us direct.

The International Harvester automotive line also includes the 3/4-ton Special Delivery Truck, Speed Trucks of 1 1/4, 1 1/2, and 2-ton, Heavy-Duty Trucks up to 5-ton, and McCormick-Deering Industrial Tractors. Service is "always around the corner." There are 160 company-owned branches in the United States and Canada.

INTERNATIONAL HARVESTER COMPANY

606 So. Michigan Ave.

of AMERICA
(Incorporated)

Chicago, Illinois

This New fare register gives results never before possible



The New National Fare Register

It protects receipts. The printed ticket and public indication make the passenger an inspector of every fare recorded. Ticket shows zone from and to, amount and kind of fare, date, operator's number and consecutive number.

It prevents over-riding. Passengers cannot over-ride without paying additional fare, because the printed ticket immediately shows the operator if they have exceeded the distance paid for.

It speeds up service. A fast, positive action keyboard, electric operation, and repeat key, keep passengers moving quickly at loading time.

It reduces auditing. The printed trip-sheet inside the register gives the auditing department a complete printed record of every fare, showing zone from and to, amount, operator's number and kind of fare. Total shows amount of all cash fares collected.

These results have been proved in actual operation on interurban lines over a considerable period of time. Our nearest representative or our factory at Dayton will give complete information on this new register.

Advantages of National Fare Registers

Fast in operation

Printed Trip-sheet giving record of every fare

Legible ticket of convenient size on good stock

Total of all cash fares collected

Classification of fares

Public indication

Fast, positive action keyboard

Repeat key for repeat fares

Small and compact

Electrically operated

National Fare Registers

The National Cash Register Company
Dayton, Ohio



No. 900-D
Double Chair



No. 108
De Luxe Seat—
divided concave
spring edge back

*Public Service
says "Hale & Kilburn"*

and backs it up with Hale & Kilburn Seats for 331 New Buses!

This large order is evidence of faith expressed by the Public Service Company of New Jersey in the quality and service of Hale & Kilburn Seats.

The experience gained through equipping steam and electric railways over a long period of years with many types of seats proves extremely valuable in outfitting the thousands of buses now supplementing railway lines.

Public Service indorses the judgment of operators who have found in Hale & Kilburn Seats the very highest standards of design, comfort, appearance and reliability.

No. 900-D for 75 Intercity Coaches

A double chair of extreme comfort, used for the 75 fast Intercity Buses. Spring Edge Base Cushion. Individual Air Spring Top Pads. Soft Spring Back.

No. 108 De Luxe for 256 City Buses

Providing unusual comfort and beauty for the 256 buses to be used in city service.

HALE & KILBURN COMPANY

General Offices and Works: 1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

Hale & Kilburn Co., Graybar Bldg., New York
Hale & Kilburn Co., McCormick Bldg., Chicago
E. A. Thornwell, Candler Bldg., Atlanta
Frank F. Bodler, 903 Monadnock Bldg., San Francisco

T. C. Coleman & Son, Starks Bldg., Louisville
W. L. Jefferies, Jr., Mutual Bldg., Richmond
W. D. Jenkins, Praetorian Bldg., Dallas, Texas
H. M. Euler, 148 N. Sixth St., Portland, Oregon
C. S. Wright Co., 68 Temperance St., Toronto, Ont., Canada

Hale and Kilburn SEATS

*Where Selection is
decided by
Performance*
"NATIONAL" TUBULAR STEEL POLES
Predominate

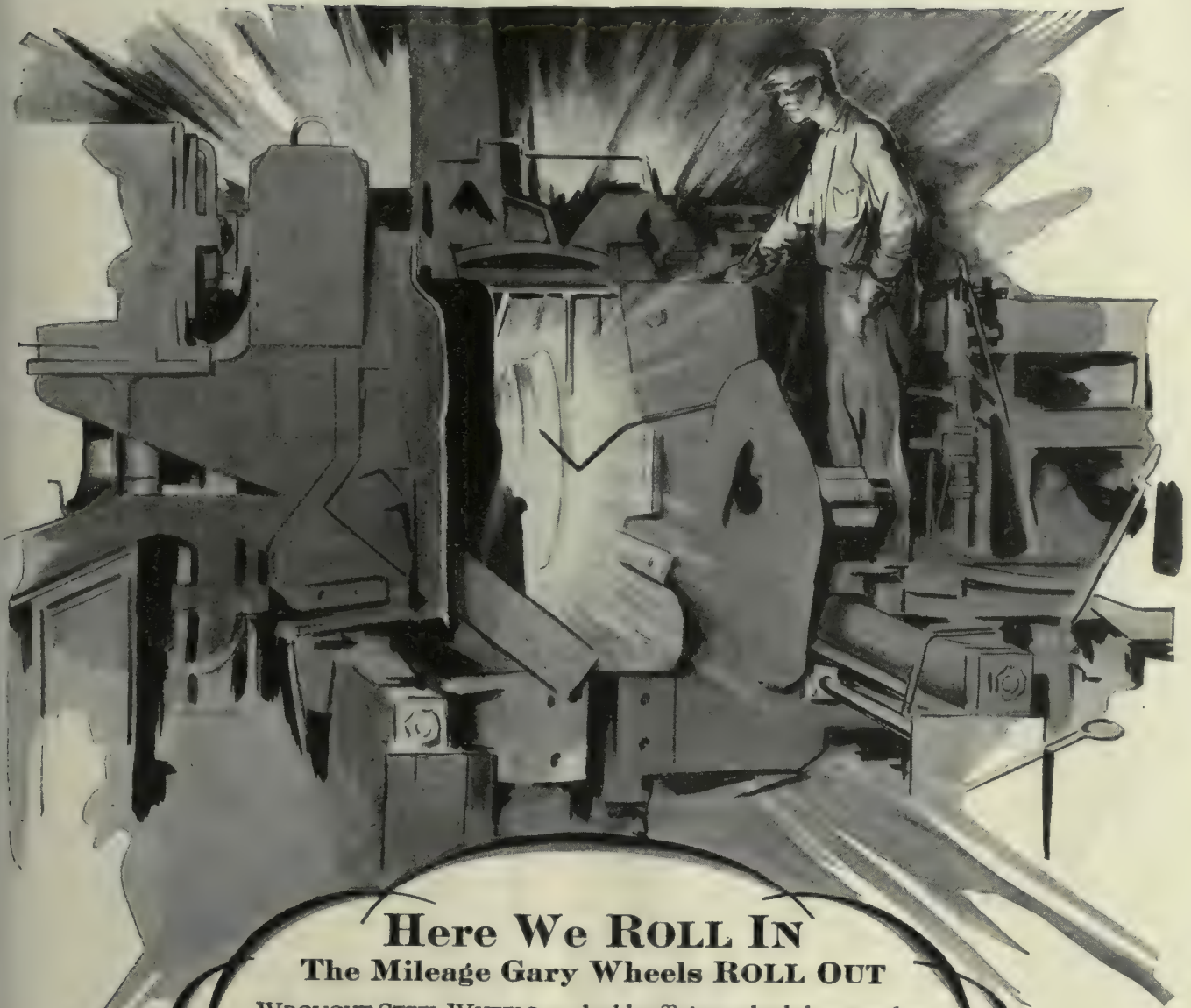
EXPERIENCE has taught many valuable lessons in the selection of poles for trolley lines, electric lighting, telephone, telegraph, and signal systems. Perhaps the lessons of greatest value are those which resulted in the policy of choosing poles for long life, reliability, and especially, for safety. The recognized safety (dependability) of "NATIONAL" Tubular Steel Poles is a consideration of first and ultimate importance, as evidenced by the extensive use of "NATIONAL" Poles throughout America.

Wherever the factors of safety, strength and appearance dominate, it will pay you to specify "NATIONAL" Poles. Made by the largest manufacturer of wrought tubular products in the world, with facilities for meeting a wide range of specifications in pole construction. Ask for Bulletin No. 14.



NATIONAL TUBE COMPANY
Frick Building, Pittsburgh, Pa.





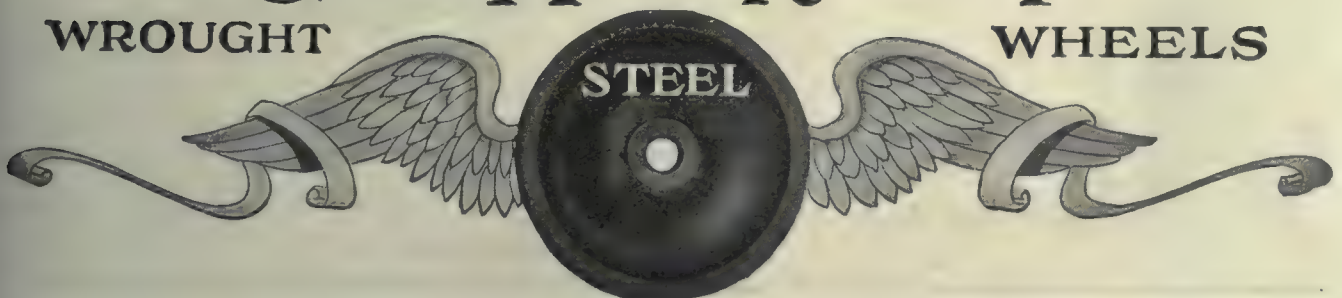
Here We ROLL IN The Mileage Gary Wheels ROLL OUT

WROUGHT STEEL WHEELS are doubly efficient wheels because they combine the advantages of rolling with those of forging. A ten-thousand-ton hydraulic press forges out defects; a remarkably efficient rolling mill rolls in multiplied mileage. In the rolling operation seven powerful rolls act in unison on the rim and web. As the wheel block revolves, a portion of the metal is forced from the web into the rim; tread and flange are formed to proper contour; the width of the rim is accurately controlled while its structure undergoes a refining process that reflects itself in long, steady and low-cost mileage

The co-operation of Gary wheel engineers is at your service.

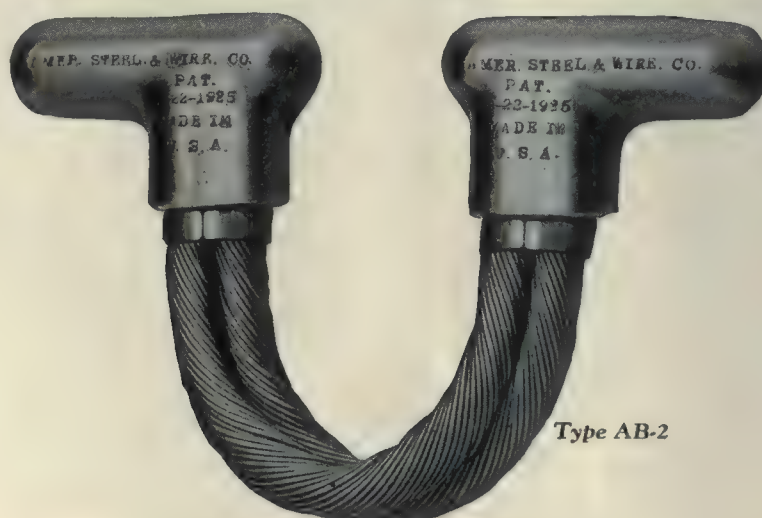
Illinois Steel Company
General Offices: 208 South La Salle Street
Chicago, Illinois

G A R Y
WROUGHT STEEL WHEELS



American Steel and Wire Company's

Arcweld Rail Bonds



Type AB-2

SINCE their introduction in 1919, Arcweld Rail Bonds have been steadily gaining the favor and approval of electric traction companies.

This bond is designed and constructed with the necessary strength to withstand hard usage, and to give long, satisfactory service.

The new design of terminal of the AB-2 bond provides an easy welding angle. It contacts with the rail along a thin line, thereby making it possible to place the bond low on the rail head.

We will gladly furnish samples of this bond upon request.



Type AB-2
applied

SALES OFFICES

Chicago
New York
Boston

Atlanta
Birmingham
Cleveland

Worcester
Philadelphia
Pittsburgh

Buffalo
Detroit
Cincinnati

Baltimore
Wilkes-Barre
St. Louis

Kansas City
Minneapolis
St. Paul

Oklahoma City
Memphis
Dallas

Denver
Salt Lake City

*San Francisco

*Los Angeles

*Portland

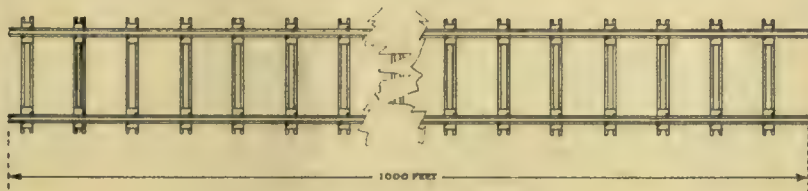
*Seattle

*United States Steel Products Co.

EIGHT MEN



LAI D 1000 FEET



of
**DAYTON
TIE TRACK
IN ONE DAY**



Eight Men Laid 1000 Feet Of Dayton Tie Track In One Day

Record of an actual case, with regular workers such as you have in your track crew.

Production like this means low track costs. Low track costs mean you can replace more track—make needed extensions more rapidly than anticipated.

The answer to the low cost is the ease and speed of handling Dayton Ties.

Dayton Track is always Smooth

THE DAYTON
MECHANICAL TIE CO.
DAYTON, OHIO



58 Plants—Daily Capacities 20,000 Wheels

1,000,000,000,000 Ton Miles in 1927

Ninety five percent of all freight cars plus a large percentage of steam and electric passenger cars are equipped with Chilled Tread Wheels. Conservative estimate places last year's loads carried on Chilled Tread Wheels in the United States and Canada at one trillion gross ton miles.

Do You Need These Facts?

The following are a few of the subject headings:

The Chilled Tread Wheel

- Safety
- Bearing Power
- Wearing Value
- Rail Abrasion
- Rail Resistance
- Brake Shoe Friction
- Friction and Wear Table
- Scrap Value
- Minimum Machining
- Easily Procurable
- Guarantee

Standard Specifications

- Material
- Chemical Requirements
- Dimensions, Weight, Design
- Inspection

A.S.T.M. Specifications

A.R.A. Specifications

A.M.C.C.W. Specifications for Car and Locomotive

A.M.C.C.W. Specifications for Industrial Use

A.R.A. Wheels, Mounting

Truck Standards

A.R.A. Specifications for Axles, Carbon Steel

A.R.A. Axle Dimensions, Limits of Wear, Capacities

Industrial Wheels

Wheel Shop Practice (A.R.A.)

A.M.C.C.W. Laboratory Equipment

Handy Reference Tables.

Write for the New

104 Page Book

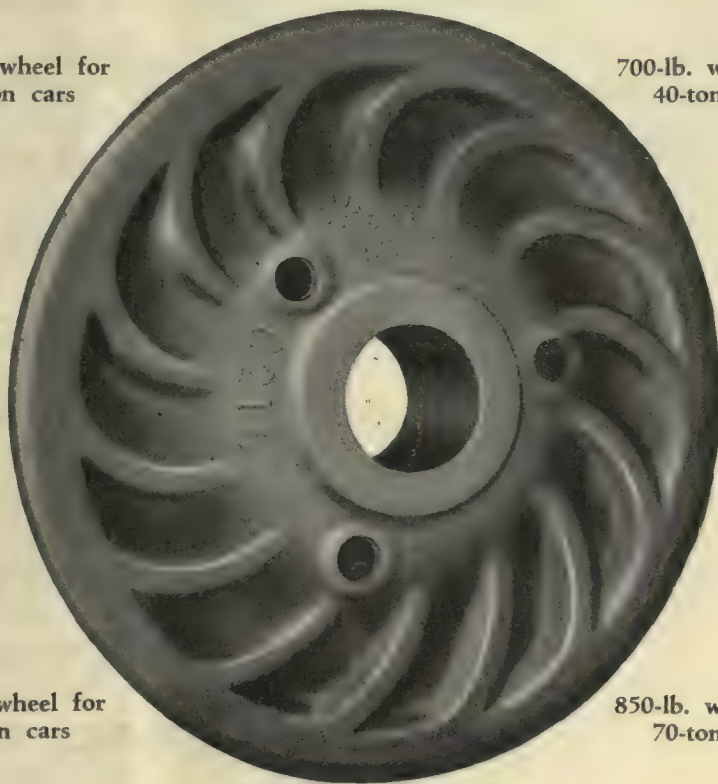
"The Chilled

Tread Wheel"

This book will be sent with the compliments of the Association to anyone who has use for the information it contains.

650-lb. wheel for
30-ton cars

700-lb. wheel for
40-ton cars



750-lb. wheel for
50-ton cars

850-lb. wheel for
70-ton cars

SINGLE PLATE WHEELS

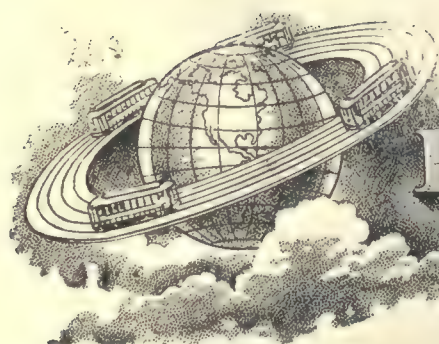
Have you investigated the advantages of this new design? Over 206,000 in service.

Chilled Tread Wheels



ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCORMICK BUILDING, CHICAGO

JUST as the electric railway companies have to compile and be guided by exhaustive statistics as to peak loads, traffic densities, costs per mile, and so forth, we must constantly keep ourselves informed as to purchasing power, density of population and all vital market information in order to maintain our service as an active asset of your service.



Barron G. Collier

INCORPORATED

CANDLER BLDG. NEW YORK

An unusual steel tie installation in San Antonio

The San Antonio Public Service Company has recently completed double tracking in concrete and paving its track area on Guadalupe Street, from Pecos to Brazos Street. The regular service over the line was maintained without interruption during the entire period of construction.

The tracks on this street cross the switching yards of the Missouri Pacific Railway, where there are eight railway tracks in a distance of 350 ft. and where it was decided to use single track only. In these short stretches of track between railway crossings, every other wood tie was removed and in its place a concrete tie was cast in the following manner: A Carnegie Steel Tie, M-24, was used as the core. The bolts were placed in the bolt holes and welded to the tie. The tie was then placed in position and blocked up under the rail. Steel reinforcing wire was placed around the tie and spot welded in several places to the top surface. A form was then built around the tie and a 1:2:4 concrete poured. This made the tie when completed 8 in. by 10 in. by 7 ft. long.

The concrete was kept damp by sprinkling for fifteen days, when the forms were removed. The regular tie clips were then applied and the



nuts tightened down on the bolts and the ties tamped up with air tampers. The alternate wood ties were then removed and the remaining concrete ties installed as before.

There was no difficulty experienced in surfacing and lining this track, it being as easy to handle as ordinary wood tie track. By the installation of the concrete ties, and by applying an asphalt wearing surface, it was possible to show a considerable savings in first cost, as only one-half the original quantity of concrete was used. The company feels this, or a similar type of construction, is very desirable in close proximity to steam railway crossings which require tamping up occasionally.

Carnegie Steel Cross Ties insure a comfortable-riding, repair-free track. Their cost per mile per year is lower than that for wood ties.

CARNEGIE STEEL COMPANY

General Offices: Carnegie Building
PITTSBURGH, PENNA.

—and the band played "There'll be a hot time in

NOTE: This advertisement also appears in other McGraw-Hill Publications, Advertising and Selling, The Magazine of Business, Factory and Industrial Management, N. Y. Times and N. Y. Herald Tribune.

TWO years ago one night in June fifty thousand friendly voices broke into cheer after cheer as a mammoth bonfire of old Grand Rapids street cars climaxed the celebration that began a few days previously. The whole city declared holiday to witness a gala parade of new cars that replaced those consumed in the flames. The opposition of press, city officials and public had been transformed into enthusiasm, confidence and co-operation with the local railway.

Refused to Take the Count

Grand Rapids is only one of many examples of the come-back that is being staged by the electric railway industry. Atlanta, Pittsburgh, Chicago, Cincinnati, Cleveland, Richmond, Ft. Worth, Youngstown, Boston, Kansas City, Toronto, Houston and numerous other cities and localities have also made noteworthy progress. The industry hardest hit by the war and post-war turmoil is on the mend.

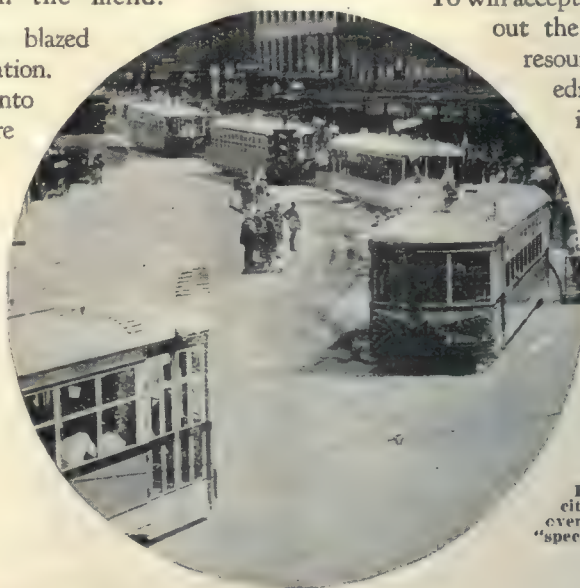
The come-back trail was blazed by a McGraw-Hill publication. While politicians rode into office on the 5-cent fare issue, when the automobile and the jitney ate into street railway revenue, when miracles in economies failed to stem the ebbing tide of income, but only made the car ride less attractive—in those seem-

ingly hopeless days *Electric Railway Journal* never for a moment lost its confidence in the basic soundness of the local transportation industry. It devoted every resource at its command to inspiring local transportation companies to fight their way out of the wilderness.

Business Journalism in Action

Electric Railway Journal maintained that the solution lay in two directions: First, in modernizing equipment and improving service so as to make the car ride attractive; second, in developing the bus as a deluxe service and co-ordinating it with existing rail service. By thus satisfying the demand for comfort, speed and faster schedule, *Electric Railway Journal* contended that patronage could be won, labor and public relations improved, and fare and other franchise difficulties relieved.

To win acceptance of this program throughout the industry, every publishing resource was used—news articles, editorials and research, meetings and personal conferences with operators, associations, manufacturers and bankers. *Electric Railway Journal* showed that modern equipment would quickly pay for itself in operating economies. Later car and equipment



NEW CARS FOR OLD — Grand Rapids, June 13, 1926, when the city's populace turned out to look over new street cars that were built on "specifications by the public."

the old town tonight"



builders and other agencies took active part in the campaign. Their industrial advertising was effectively teamed with the editorial program. Finally operating companies began adopting the new methods; the rift in the clouds appeared.

This modernization campaign won for *Electric Railway Journal* the 1927 award for the most outstanding editorial service by a business paper to its industry. The award was given by Associated Business Papers, Inc., a non-profit organization of the leading business papers, whose purpose is to stimulate achievement in business journalism.

An Every-Day Editorial Job

In the same purposeful way, each McGraw-Hill publication works in its field for better conditions, better production methods, better products, better marketing. *American Machinist* campaigns for modern machine tool equipment in the metal-working

industries; *Engineering News-Record* for year-round construction work; *Coal Age* for mechanization of the mines; and so on. Receptive markets are a natural by-product of such editing. It dredges the advertising channel to those markets.

The readers of McGraw-Hill publications are the decision men of Industry, the men who must keep in touch with developments vital to their progress. Because each industry needs and reads its McGraw-Hill publication, there is created a direct avenue of approach to the responsible men of industry. Thus through industrial advertising in these publications, waste is eliminated and results increased.

How to make better use of such business papers is shown by one of McGraw-Hill's researches, "Industrial Marketing at Work." Manufacturers selling to industry, their advertising agents and their bankers are welcome to a copy by addressing the nearest office listed below.

McGraw-Hill Publications

McGraw-Hill Publishing Company, Inc.

New York Chicago Cleveland Philadelphia St. Louis San Francisco London



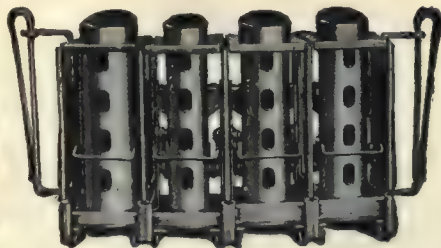
JOHNSON FARE COLLECTING SYSTEMS



Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates. It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.



Johnson Fare Box Co.

4619 Ravenswood Ave., Chicago, Ill.

ELECTRICAL INSULATION

PERFECT
MICANITE
INSULATOR
REG. U.S. PAT. OFF.

PERFECT
EMPIRE
INSULATOR
REG. U.S. PAT. OFF.

Micanite and Super-Micanite
Sheets, Commutator Segments, and
Commutator Rings

Micanite Tubes and Washers

Linotape, Seamless or Sewn Bias
(Yellow or Black Varnished Tapes)

Empire Oiled Cloths and Papers
(Yellow or Black)

Compounds, Varnishes, Etc.

Send for catalog and helpful booklet on Commutator
Insulation and Assembly

MICA INSULATOR COMPANY

Largest manufacturers in the world of mica insulation.
Established 1893.

New York: 200 Varick St. Chicago: 542 So. Dearborn St.
Cleveland Pittsburgh Cincinnati
San Francisco Toronto Los Angeles Seattle
Works: Schenectady, New York. London, England

PANTASOTE

TRADE MARK

—the car curtain and upholstery material that
pays back its cost by many added years of
service. Since 1897 there has been no substitute
for Pantasote.

AGASOTE

TRADE MARK

—the only panel board made in one piece. It is
homogeneous and waterproof. Will not separate,
warp or blister.

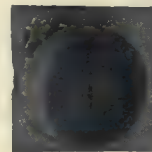
*Standard
for electric railway cars
and motor buses*



Samples and full
information gladly
furnished.



The PANTASOTE COMPANY, Inc.
250 Park Avenue, NEW YORK



Complete satisfaction

Operating perfectly and requiring
minimum attention for maintenance
and lubrication, Earll Catchers and
Retrievers give genuinely satisfactory
results. Their refinement of design,
and mechanical superiority are sum-
marized in the following five features,
peculiar to Earll construction.

No-wear Check Pawl
Free-Winding Tension Spring
Ratchet Wind
Emergency Release
Perfect Automatic Lubrication

Earll Catchers and Retrievers
C. I. EARLL, York, Pa.

Canadian Agents:
Railway & Power Engineering Corp., Ltd., Toronto, Ont.
In All Other Foreign Countries:
International General Electric Co., Schenectady, N. Y.

M-J Armature Babbitt



No less than twenty-five different grades of Babbitt have been successfully perfected in the More-Jones line, designed for various services and at varying prices. "Armature" for electric railways is the recognized standard. *Let us quote you.*

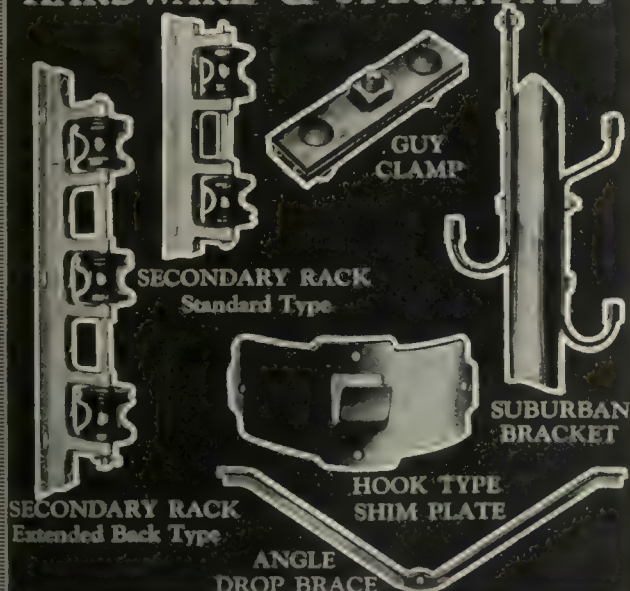
National Bearing Metals Corporation

New York, N. Y. St. Louis, Mo. Pittsburgh, Pa.
Jersey City, N. J. Portsmouth, Va. Meadville, Pa.

**"MORE-JONES
QUALITY PRODUCTS"**

TRUSCON

POLE LINE HARDWARE & SPECIALTIES



Write for Catalog and Price List
TRUSCON STEEL COMPANY ... YOUNGSTOWN, OHIO
Established 1903
Warehouses and Offices in all Principal Cities



TOULOUMBAJIS

In certain sections of Constantinople the touloumbajis, or irregular firemen, run to a fire with a simple pump mounted in a packing box.

Arriving on the scene they start to haggle with the owner of the building on a price to save either the house or the furniture.

In other words, their first interest is to see how much money they can get out of the emergency.

Thank goodness that element has been largely eliminated from carbon brush application.

Fact is since the widespread adoption of the Morganite method of selling brushes on engineering prescription, emergencies don't arise.

Morganite Brush Co., Inc.

Main Office and Factory
3302-3320 Anable Ave., Long Island City, N. Y.

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn. Ave.
Cincinnati, Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
Cleveland, Electrical Engineering & Mfg. Co., 320 Union Building.
Baltimore, O. T. Hall, Sales Engineer, 432 North Calvert St.
Revere, Mass., J. F. Drummey, 75 Pleasant Street.
Los Angeles, Electrical Engineering Sales Co., 502 Delta Building.
San Francisco, Electrical Engineering Sales Co., 222 Underwood Bldg.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 133 Eastern Ave.
Montreal, Can., Railway & Power Engineering Corp., Ltd., 68-70 St. Antoine St.
Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O. Box 325.

Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

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New York

STONE & WEBSTER

Incorporated

Design and Construction
Examinations Reports Appraisals
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NEW YORK BOSTON CHICAGO

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys
Better Service—Financial Reports
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52 Vanderbilt Ave.

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SANDERSON & PORTER

ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Design Examinations Construction Reports Management
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CHICAGO NEW YORK SAN FRANCISCO

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Engineer—2301 Connecticut Ave., N.W., Washington, D. C.

TRANSPORTATION SURVEYS

Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City
Plans, Service, Routing, Valuation, Economic Studies

EXPERIENCE IN 20 CITIES

ALBERT S. RICHEY ELECTRIC RAILWAY ENGINEER

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Consulting Engineers

Appraisals Reports Rates Service Investigation
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683 Atlantic Ave., BOSTON, MASS.

A. L. DRUM & COMPANY

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RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE
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and Equipment Maintenance

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Phone:
Hanover 2142

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49 Wall Street

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INCORPORATED

ENGINEERS AND CONSTRUCTORS

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FINANCING
MANAGEMENT

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction
43 Cedar Street, New York City

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E. H. FAILE & CO.

Designers of

Garages—Service Buildings—Terminals

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NEW YORK

MCCLELLAN & JUNKERSFELD

Incorporated

ENGINEERING AND CONSTRUCTION

Examinations—Reports—Valuations

Transportation Problems—Power Developments

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St. Louis

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of
Water Tube Boilers
of continuing reliability**

BRANCH OFFICES

ATLANTA, Candler Building
BOSTON, 80 Federal Street
CHICAGO, Marquette Building
CINCINNATI, Traction Building
CLEVELAND, Guardian Building
DALLAS, TEXAS, Magnolia Building
DENVER, 444 Seventeenth Street
DETROIT, Ford Building
HOUSTON, TEXAS, Electric Building
LOS ANGELES, Central Building
NEW ORLEANS, 344 Camp Street



WORKS
Bayonne, N. J.
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**Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893**

BRANCH OFFICES

PHILADELPHIA, Packard Building
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PITTSBURGH, Farmers Deposit Bank Building
PORTLAND, ORE., Falling Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Building
SEATTLE, L. C. Smith Building
HONOLULU, T. H., Castle & Cooke Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

WALTER JACKSON

Consultant on Fares and Motor Buses

**The Weekly and Sunday Pass—Differential
Fares—Ride Selling**

Holbrook Hall 5-W-3

160 Gramatan Ave., Mt. Vernon, N. Y.

TRAFFIC CONSULTANT

Freight Rate, Tariff and Traffic Analyses;
Advisory Freight Traffic Assistance
on Special or Monthly Basis;
Preparation of Cases before Interstate Commerce
Commission and State Commissions.

HALSEY McGOVERN

Mills Bldg., 17th and Pa. Ave., Washington, D. C.

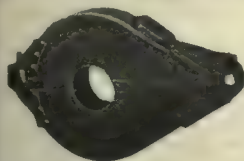
When writing the advertiser for information or
prices, a mention of the Electric Railway
Journal would be appreciated.

THE P. EDWARD WISH SERVICE

50 Church St.
NEW YORK

Street Railway Inspection
DETECTIVES

131 State St.
BOSTON



CHILLINGWORTH

One-Piece Gear Cases

Seamless—Rivetless—Light Weight
Best for Service—Durability and
Economy. Write Us.

Chillingworth Mfg. Co.

Jersey City, N. J.

THE WORLD'S STANDARD

"IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irv-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.

Irvington, N. J.

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Car Heating and Ventilating

—are no longer operating problems. We can show you
how to take care of both with one equipment. The Peter
Smith Forced Ventilation Hot Air Heater will save, in
addition, 40% to 60% of the cost of any other car heat-
ing and ventilating system. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

Your Name

in this space in all issues where larger
display space is not used backs up your
advertising-campaign and keeps your
name in the alphabetical index.



"Bates Poles Outlive the Bond Issues that Buy Them" BATES POLES AND STRUCTURES

Bates Expanded Steel Truss Co.

General Offices and Plants
EAST CHICAGO, INDIANA, U. S. A.

Bethlehem Products for Electric Railways

Tee and Girder Rails; Machine Fitted Joints;
Splice Bars; Hard Center Frogs; Hard Center
Mates; Rolled Alloy Steel Crossings; Abbott and
Center Rib Base Plates; Rolled Steel Wheels and
Forged Axles; Tie Rods; Bolts; Tie Plates and
Pole Line Material.

Catalog Sent on Request

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

BETHLEHEM



COLUMBIA

Railway Supplies and Equipment

Machine and
Sheet Metal Work

Forgings
Special Machinery
and Patterns

Grey Iron and
Brass Castings

Armature and
Field Coils.

The Columbia Machine Works and M. I. Co.

265 Chestnut St., corner Atlantic Ave.,
Brooklyn, New York

Griffin Wheel Company

410 North Michigan Ave.
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Griffin Wheels

with
Chilled Rims
and
Chilled Back of Flanges
For Street and Interurban
Railways

FOUNDRIES:

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St. Paul
Los Angeles
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The DIFFERENTIAL CAR



*Standard on
60 Railways for*

Track Maintenance
Track Construction
Ash Disposal
Coal Hauling
Concrete Materials
Waste Handling
Excavated Materials
Hauling Cross Ties
Snow Disposal

Use These Labor Savers

Differential Crane Car
Clark Concrete Breaker
Differential 3-way Auto Truck Body
Differential Car Wheel Truck and Tractor

THE DIFFERENTIAL STEEL CAR CO., Findlay, O.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

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Philadelphia	Pittsburgh	Dallas	
Pacific Coast Representative:			
Los Angeles	United States Steel Products Company	San Francisco	Seattle
Portland			
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WHARTON

1894

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1928

SPECIAL TRACKWORK

Manganese Steel in Trackwork, originated
by Wharton over thirty-four years ago, is
still the metal par excellence for this purpose.

WM. WHARTON JR. & CO., INC.
EASTON, PA.

Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley
Wheels and Harps has been
demonstrated by large and small
electric railway systems for a
period of thirty years. Being
exclusive manufacturers, with
no other lines to maintain, it is
through the high quality of our
product that we merit the large
patronage we now enjoy. With
the assurance that you pay no
premium for quality we will
appreciate your inquiries.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge \$2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....\$4.50 an inch
4 to 7 inches.....4.30 an inch
8 to 14 inches.....4.10 an inch
Rates for larger spaces, or yearly rates, on request.
An advertising inch is measured vertically on one column, 3 columns—30 inches—40 a page.

POSITIONS VACANT

VACANCY for qualified man with full knowledge of motor coach mechanics, supervising ability, maintenance methods, etc. P-102, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

POSITIONS WANTED

A TRACK superintendent. Associate Member American Society Civil Engineers. Qualified by technical training and over 15 years' practical street railway track experience. Full charge as superintendent in field of over 300 men, steam shovels, concrete mixers, welding, grinding and acetylene outfits. With one of the largest street railways 15 years. Successful handling men and work. Now employed. PW-97, Electric Railway Journal, Tenth Ave. at 36th St., New York.

ENGINEER with 16 years' experience in construction of high-tension overhead construction for electric railways and power transmission lines. Five years' experience in power and sub-station design. Highest references and recommendations. PW-101, Electric Railway Journal, 7 So. Dearborn St., Chicago, Ill.

GENERAL superintendent or manager; successful; seeks connection with a future. PW-77, Electric Railway Journal, Tenth Ave. at 36th St., New York.

MASTER mechanic with 17 years' experience city and interurban cars, buses, automobiles and building maintenance. Electrical engineering graduate. PW-100, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation; well known in electric railway field, with broad experience, successful record city, interurban railways and buses, available short notice, correspondence invited. Fine references. PW-103, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

WANTED—Position as manager, general superintendent or M. M. of electric railways. Can qualify in every way. PW-99, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

IMPORTANT

Original letters of recommendation or papers of value should not be enclosed to unknown correspondents—send copies.

LIQUIDATION SALE!

All equipment from THREE COMPLETE RAILWAYS offered at SACRIFICE PRICES for Quick Disposal!

Many CARS and OTHER EQUIPMENT in Operating Condition

CARS

360 Cars single and double truck, open and closed types, 20 to 36 passenger seating capacity. Open types seat from 36 to 52 passengers. Also freight and service cars, snow plows and sweepers.

TRUCKS

Single and double, standard makes such as, Brill, Standard, Peckham, Wason, Taylor, Bemis, Laconia, etc.

MOTORS

578 Motors, G. E. and Westinghouse. G. E. types 52, 57, 67, 70, 74, 87, 800, 1000. Westinghouse types 12A, 49, 56, 93A, 101B, 305A-2, 306 C.V., and others.

EQUIPMENT

C-P 28 Compressors, Controllers K35, K10, K11, K12, and 36J. Also other miscellaneous equipment.

Send Your Inquiries—Get Our Prices!

J. W. GERKE, Railway Equipment

303 FIFTH AVE., NEW YORK. Telephone: Caledonia 6271

Why Save It?

Equipment you have replaced, or for which you have no further use can probably be sold at a good price now. Later it may not be worth as much.

Weed out equipment and let a

"Searchlight" Ad

help you sell it promptly

G-9

Railway Motors Wanted

120—Railway Motors, 35-40 hp., to be mounted on Brill K-51-E truck fitted with 5-in. axle and 26-in. wheel

Address:

A. H. STOCK

2276 Franklin Avenue, Toledo, Ohio

NEW AND RELAYING RAILS

Tie Plates
—Switches—Frogs
—Portable Track
Finest Quality
Flat Cars—Locomotives
Quick Delivery Lowest Price

HYMAN-MICHAELS CO.
Peoples Gas Building
St. Louis CHICAGO San Francisco

FOR SALE

MOTORS

130 Westinghouse, Type 514-C.
Fine condition. Low price.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

We buy entire
Railways and
Power Plants

**H. E. SALZBERG
COMPANY, Inc.**
225 Broadway New York City

We sell
Street Railway
and Power
equipment

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue
This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Advertising, Street Car
Collier, Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Air Brake Co.

Anchor, Guy
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Works
Elec. Service Supplies Co.

Automatic Return Switch
Stands
Ramapo Ajax Corp.

Automatic Safety Switch
Stands
Ramapo Ajax Corp.

Axles
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Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Illinois Steel Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.

Babbitt Metal
National Bearings Metal Corp.

Babbitt Devices
Columbia Machine Works

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
National Bearings Metal Corp.
Westinghouse E. & M. Co.

Bearings, Center and Roller
Side
Columbia Machine Works
Stucki Co., A.

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Consolidated Car Heating Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Elec. Service Supplies Co.

Benders, Rail
Railway Track-work Co.

Blades, Saw
Victor Saw Works

Bodies, Bus
Brill Co., The J. G.
Cummings Car & Coach Co.

Body Material, Haskellite and Plymet
Haskellite Mfg. Corp.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bolts & Nuts, Track
Illinois Steel Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms
(See also Poles, Ties, Posts, etc.)
Bates Expanded Steel Truss Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Bemis Car Truck Co.
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National Bearings Metal Corp.

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Standard Steel Works Co.

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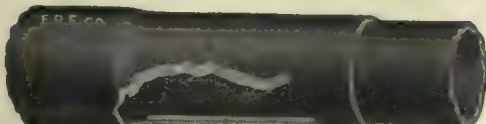
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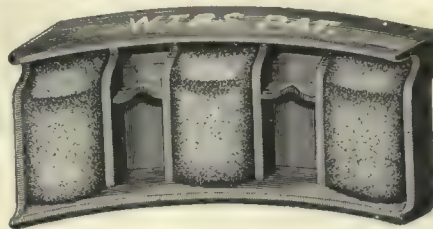


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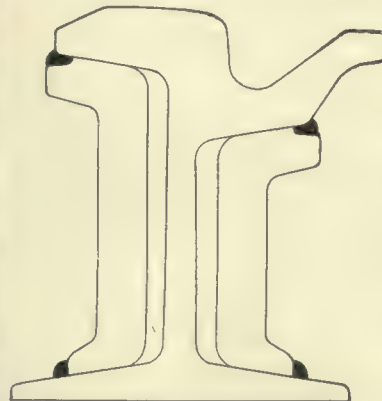
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THE LEAVENWORTH TIMES, FRIDAY EV

LOCAL MEN LOUD IN THEIR PRAISE OF NEW TRAMS

On Trial Trip Declare New Interurban Cars as Easy Riding as Pullman Coach.

"LAST WORD" IN CAR MAKING

Car Builder Describes New Equipment as Best Interurban Rolling Stock Anywhere in Country
—In Service Monday

The four new interurban cars delivered several days ago by the American Car company to the Kansas City, Leavenworth & Western will be placed in service Monday, according to present plans, it was announced yesterday by Walton Holmes at a luncheon given thirty Leavenworth and Kansas City men at the Kansas City club. Leavenworth men who made the trip to Kansas City yesterday as guests of the officials of the road were loud in their praise of the new cars. The car rolled smoothly over the rails, those making the trip declaring it rode as easily as a Pullman. The special car followed a regular and kept the lar schedule with ease.

At Chelsea Junction the was met by Mr. Holmes, number of other officials. The special was in charge of E. Barnhardt. Other making the trip from Leavenworth were G. W. Hall, secretary of city lines, and roadmaster.

Those making the trip were W. Goss, president National bank; O. president, Wulfkuhl; Eugene Lytle, president of the railway company; Henry Oelsman, Homer postmaster; J. ty clerk; W. engineer; J. engineer; To Joe Tony Oberlin, the honor of making with one of the new cars. Following an excellent run there was quite a bit of speech making and throughout there was a note of optimism for the future of electric transportation.

Mr. Holmes in introducing the speakers declared that the new equipment had been purchased because the road had faith in Leavenworth. All that was asked in return was that Leavenworth keep faith with the road.

"I do not pose as a railroad man," said Peter W. Gobel, vice-president, "but I have had experience with railroads and electric. I know that they have cost a lot of money."

Mr. Gobel added while one gets the property that becomes one can't sell it. With the interurban Mr. Gobel called fact that every year being junked because money could not be made available to continue operation and the owners took the only other course and junked the lines at a loss.

"That sort of proceeding could have been avoided to every interurban operating anywhere. But for

age to keep them running hope of better times," said Gobel.

"We are going to give the best possible service at the cost possible and we hope people along the line and worth will recognize and give us a reasonable rate."

Mr. Gobel said the newness of the line was soon, cost would be items of freight.

W. S. McLucas, Kansas City banker, who left Leavenworth on the incoming equipment. If two cities, he declared it was "courage" to go and "gentlemen" in purchase.

The new electric cars, both new and old, read, "Col. of the Kansas City, Leavenworth & Western."

Regarding the question of increased business that these cars have brought us, I feel safe in saying that our passenger business since the operation of the new cars has been increased 12% or 1/8. Of course, there has been a decrease in operating costs; but am unable at present to state what percentage this amounts to. The main saving, of course, is in the power.

New cars are fifty-two passenger cars, with four 35 horse motors, and weigh 38,000 pounds apiece. These a similar number of sixty passenger cars, with four 75 horse power motors, which weigh 70,000 pounds apiece. It requires, I should, place at 40%, that is, new cars as only 80% as much power to operate one of the old cars. There will be one of the new cars saving one of the old cars. The use of the new and lighter cars will prove a very profitable one.

On the whole, we feel that our investment in new and lighter cars will prove a very profitable one.

Very truly yours,
W. E. Barnhart
Assistant General Manager.

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GENERAL OFFICE
KANSAS CITY, KANSAS
January 23rd, 1928.

Mr. F. L. Markham,
American Car Company,
St. Louis, Mo.

Dear Sir:

Referring to the four light weight Interurban cars that we purchased from your company last year, their operation to date has been satisfactory.

We put them in operation December 12th, 1927; but operated them as two-men cars until yesterday, January 22nd, 1928, when we commenced operating them as one-man cars. I think the one-man car operation is going to be entirely satisfactory.

Regarding the question of increased business that these cars have brought us, I feel safe in saying that our passenger business since the operation of the new cars has been increased 12% or 1/8. Of course, there has been a decrease in operating costs; but am unable at present to state what percentage this amounts to. The main saving, of course, is in the power.

On the whole, we feel that our investment in new and lighter cars will prove a very profitable one.

Very truly yours,
W. E. Barnhart
Assistant General Manager.



Brill Light Weight Interurban Cars



a-806-LC

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Engine reliability is of paramount importance on a job like this. With bad roads, long distances between supply depots and cities, in foreign countries where there were neither proper tools nor repair parts available for emergencies, it required a most dependable engine. Bred from a line of heavy-duty industrial engines that have a twenty-year heritage of unfailing performance, the success of this train was to be expected. But this same kind of reliability will be found in the Waukesha line of heavy-duty bus and truck engines which are now available in a wide range of powers of both six and four-cylinder types.

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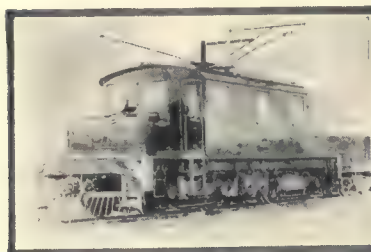


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A Gracious Recognition of an Ideal

IN THE mail of a publisher there come many comments—some complimentary, some critical. All are helpful. They reflect the readers' reactions to a publication's policies. Like chips on a stream they sometimes indicate eddies and cross-currents of thought that suggest the need for careful soundings and a check of the editorial course.

Rarely, though, does a letter bring a recognition of a paper's ideals so gracious as one which was received during the past week from the president of a large electric railway. Commenting on the JOURNAL's effort to stimulate local transportation progress, he puts into words the editorial ideal that motivates every McGraw-Hill publication—"A trade journal that lives for its industry."

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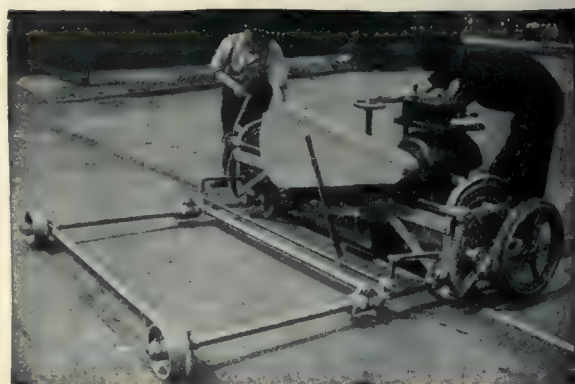
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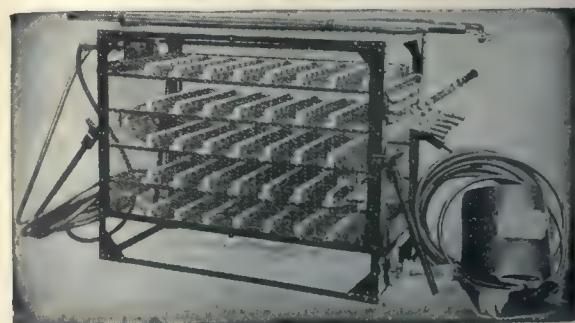
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Large contact area of terminals, and extreme flexibility of this type afford an exceptionally durable bond, practically immune to vibration. Adapted to standard T-rail joints.

AW-12 Bond

Here is a bond that can be made to grip the rail base before welding, just by a tap of the hammer. Heavy terminals protect the deposited metal.

O-B Type LW Arc Welder

A unit which will stand any investigation as to its economy and practicability. Resistance coils and insulation designed especially for hardest service, and arranged for most rapid heat dissipation.

Ohio Brass Co.



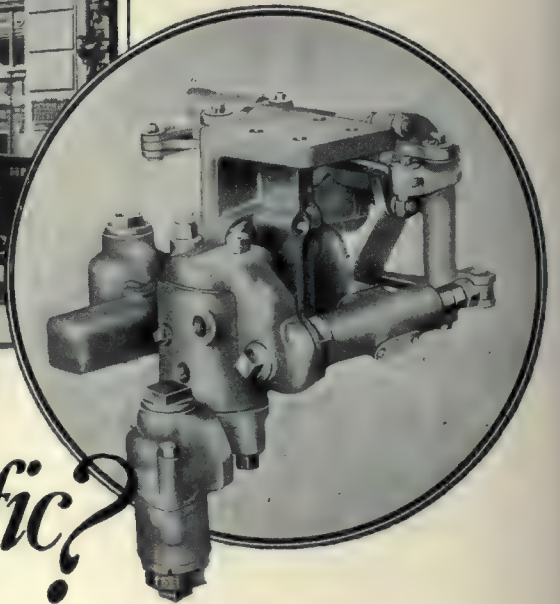
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PORCELAIN INSULATORS
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The Westinghouse Variable Load Brake is an attachment for use with straight air or semi-automatic equipments by means of which the brake cylinder pressure is automatically adjusted as the car weight changes, to provide the same retarding effect throughout range of passenger load.



*Can your cars
lead the traffic?*



Confer with our representative regarding the desirability of Westinghouse Variable Load Brakes for your new cars.

WHEN thoroughfares are congested . . . when other vehicles are contending for the right of way . . . when traffic demands are greatest . . . are your cars as mobile as other conveyances that use the streets . . . can they lead the traffic rather than lag behind?

They can if equipped with the Westinghouse Variable Load Brake. This modern brake for modern cars is as effective on loaded cars as on empty cars and assures uniformly short stops under all conditions. It furnishes adequate control to enable cars to hold their place in the traffic stream.

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works, WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES

LONG LIFE



“OLD TIMERS” enjoy giving reasons for their long life. “Never touched tobacco,” says one. “Smoked all my life,” says another. The reasons are as varied as the individuals.

But for the long life without maintenance found in Davis “One-Wear” Steel Wheels there is a substantial reason.

A special composition, heat-treated steel gives the strength and wear resistance that makes long life possible.

Davis Wheels are “One-Wear” Wheels by reason of their own unusual physical qualities.

AMERICAN STEEL FOUNDRIES

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On the journal-box covers of self-propelled cars the Timken name has traveled millions of miles, in all kinds of territory.

Timken-equipped journals, with negligible friction, and highest capacity for thrust and shock as well as radial load, are largely responsible for the low-cost car-miles which have popularized self-propelled equipment.

Added to the economy in maintenance, lubricating and power, is the smoother operation which develops good will and more passenger-miles per car-mile.

Maximum return from anti-friction journals calls for *railroad* anti-friction bearings. The outstanding *railroad* anti-friction features are Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS*, and Timken-made electric steel.

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TIMKEN *Tapered
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GOLDEN GLOW HEADLIGHTS

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Provide safety for your passengers and your equipment on night runs by means of good headlights—Golden Glow Headlights.

They are equipped with the famous Golden Glow mirror glass reflectors. Being made of glass, these reflectors offer a permanent reflecting surface. Due to the greenish glass used, they project a golden light which is less blinding yet much more penetrating in fog and snow than a brilliant white light.

In city types the permanency of the Golden Glow glass reflector is offered, but in a prismatic type, so that a short wide beam of high intensity is secured.

We will be glad to send you full particulars of Golden Glow Headlights as well as other Keystone Equipment found on the modern well-equipped car.



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Where quick stops
are the rule—

How about your wheels?

Flashing traffic lights, whistles, stop signals necessitate frequent braking and short stops. The wheels and axles of modern cars must absorb the punishment and deliver their full mileage.

"Standard" Wheels and Axles are standard on modern cars.

*Rolled
Steel
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STYLES IN TRACK CONSTRUCTION

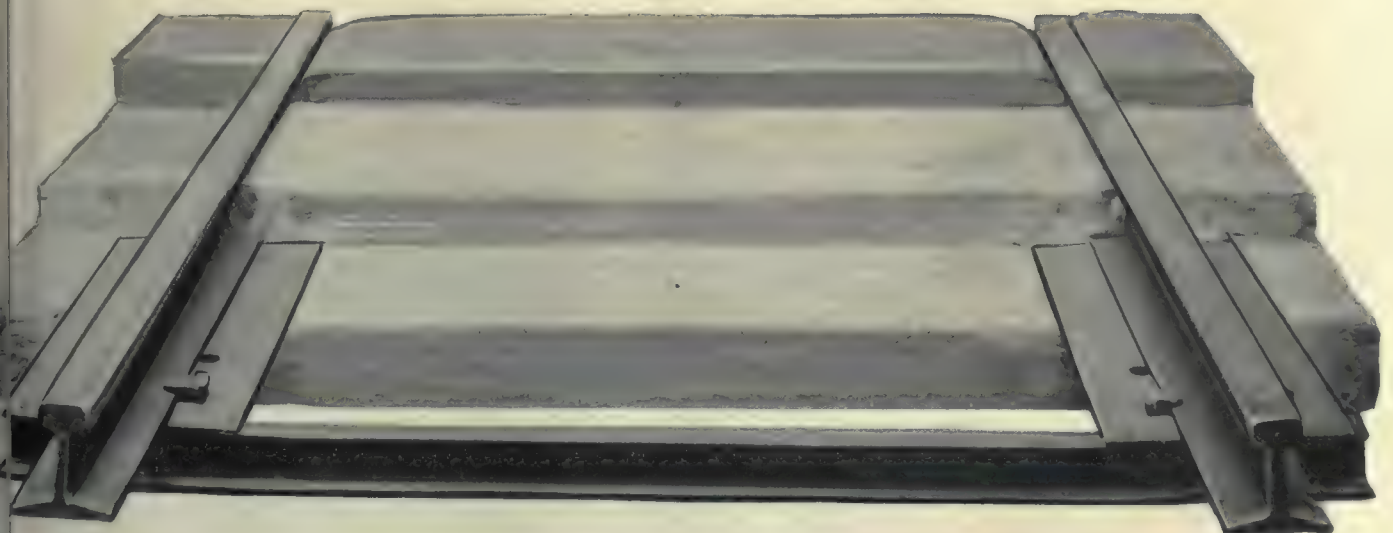
8

This is the last of a series of eight inserts on Paved Track Design with Steel Twin Ties as used in over 45% of the cities of over 200,000 population.



TODAY

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- No. 2 Boston
- No. 3 Detroit
- No. 4 Philadelphia
- No. 5 Kansas City
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- No. 7 Washington
- No. 8 Buffalo


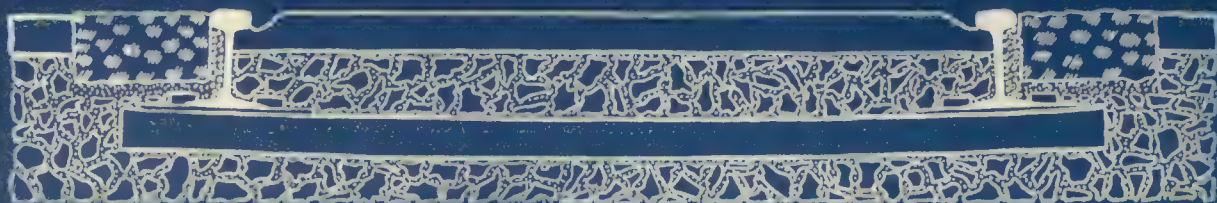


STEEL TWIN TIE TRACK

THE BASE OF MODERNIZATION



In Buffalo



STEEL TWIN TIES are used in Buffalo with 102-516 rail section, with the ends bent upward to cant the rail 1 in 25 and the rails are thermit welded. The track foundation is concrete, paved with asphalt between rails, with granite block headers on the outside rails.

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The International Steel Tie Co.
Cleveland, Ohio



TWIN TIES ARE ALL STEEL

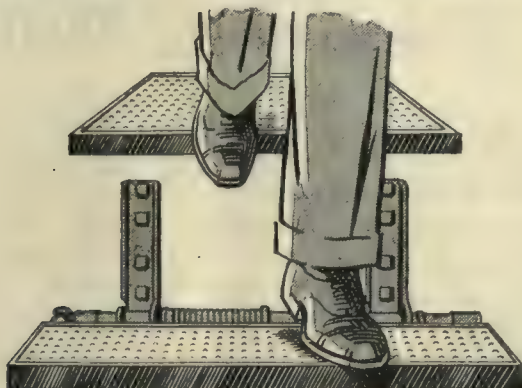
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Nearly 100 cities  have equipped

Nearly 4000 cars  with more than

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The Public Will Buy

The heaviest percentage of the riding public want to ride in your cars. You are the lowest cost and most convenient mode of travel at its command. Cost and safety are always in the public mind. But are you, as a matter of sound merchandising, doing the obvious thing to encourage your patronage? Magnetic Brakes are integral parts of Cincinnati BALANCED Lightweight Cars. The Cincinnati Duplex Air and Magnetic Brakes in Cincinnati BALANCED Lightweight cars enable the motorman to stop in an emergency from 2 to 6 seconds more quickly than with average equipment.

That spells SAFETY. It means savings through the preventing of accidents.

Cincinnati BALANCED Lightweight cars increase schedule speeds wherever they are in service. They speed schedules and reduce accident figures. "Speed with Safety" helps to make every rider a more frequent rider.

*— still a step ahead
of the modern trend!*

BLEST

GENTS

OMMAND



The Public Will Buy

Given the choice between comfort and the lack of it, the riding public will buy comfort whenever possible. It is a matter of record that the appearance of Cincinnati BALANCED Lightweight cars bring increased patronage.

Sellers of service of any kind—and particularly service that the buyers must have—are coming to realize that the good opinion of the buyers is one of their most valuable by-products. There is a vast difference between a rider who comes aboard only because he must and one who comes aboard because he gets an unusual degree of comfort along with necessity. He puts valuable good will into the fare box along with his cash.

The services which vie with the street car owe much of their progress to faster schedules and a higher element of comfort. Cincinnati BALANCED Lightweight Cars are winning riders for other properties. When may we discuss the application of their outstanding qualities to your own problems?

Cincinnati Car Company, Cincinnati, Ohio

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Helping Flatten Maintenance Curves

NUTTALL Products enable many traction properties to cut repair and replacement costs to the minimum. Their extraordinary wearing qualities are the result of an intimate knowledge of electric railway requirements, and facilities to produce superior equipment. Our engineers will gladly assist you with practical recommendations.

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The new W-N Drive for light weight high speed motors has a high reduction ratio with noiseless smooth running helical gears, Timken Roller Bearings, and an oil-tight steel case.



The Nuttall Timken Roller Bearing
Trolley Base (Form U. S. 20A)



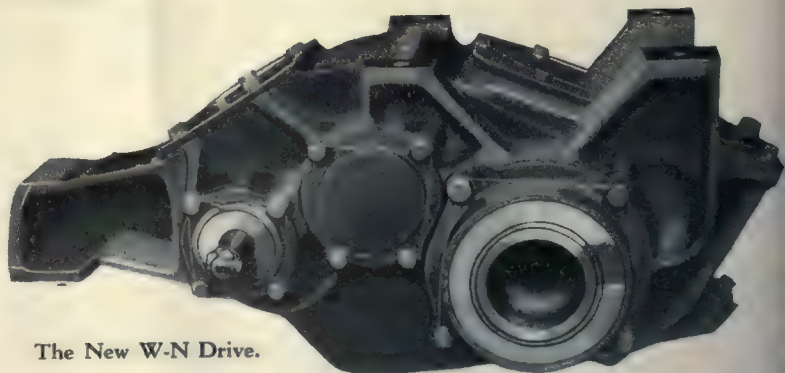
Nuttall Helical Gear and Pinion

R.D. NUTTALL COMPANY
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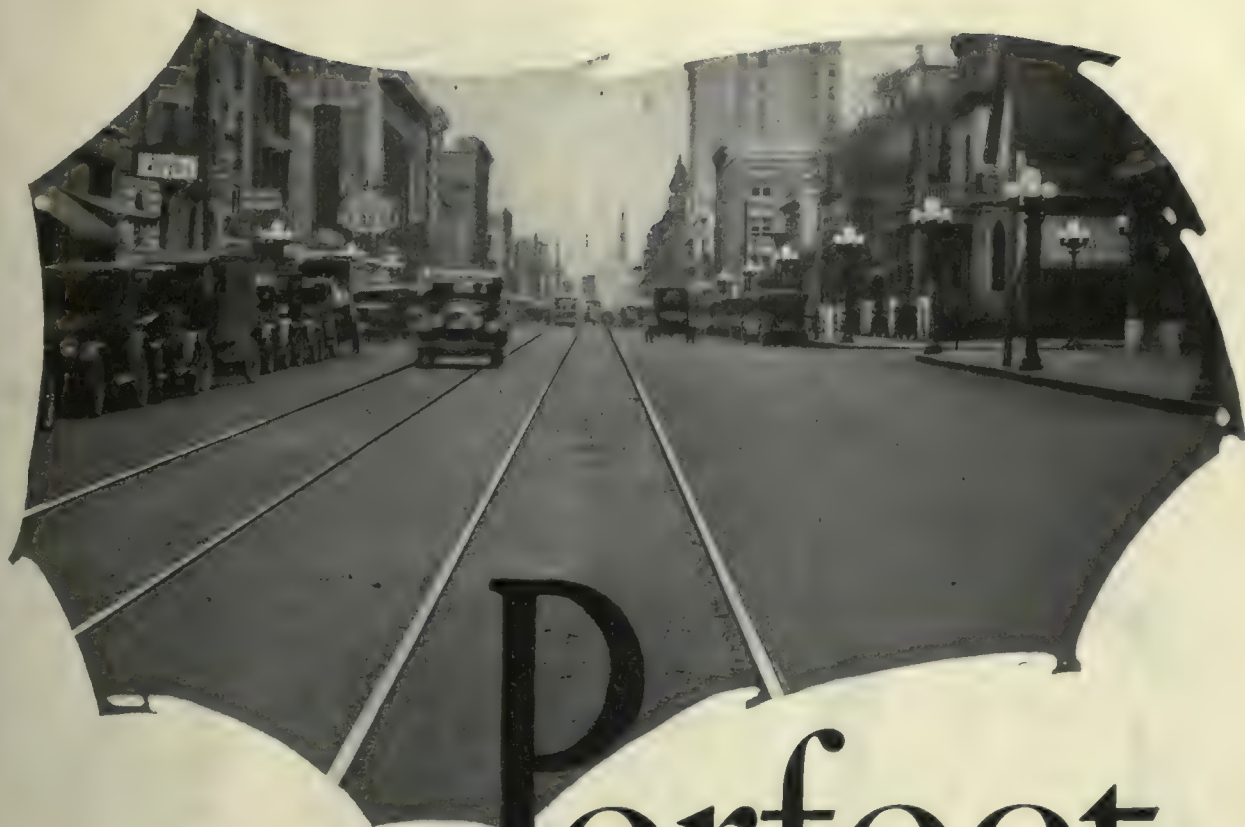
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The New W-N Drive.

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Perfect

—after 11 years

It's Dayton Tie Track

Here's a piece of track laid on Dayton Ties in 1918—ten years ago.

Can there be any better testimonial of the lasting qualities of Dayton Tie Track?

And think of the reduction in car maintenance this permanently smooth track affords.

Small wonder that sales of Dayton Ties grow almost beyond belief.



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DAYTON, OHIO



ELECTRIC DRIVE
for
GAS-ELECTRIC BUSES
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GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

Popular preference



THE finest tribute ever paid to the G-E equipped gas-electric bus is the popular appreciation of its unexampled performance.

Riders prefer this bus to others because its rapid acceleration and ability to take advantage of openings in crowded traffic bring them to their destination in 20 to 25 per cent less time. The quick trip and the absence of noise, jerks, and vibration attract passengers.

Records show an average increase of 25 per cent in the number of daily riders for each G-E equipped gas-electric that has replaced a mechanical-drive bus.

390-30

ELECTRIC

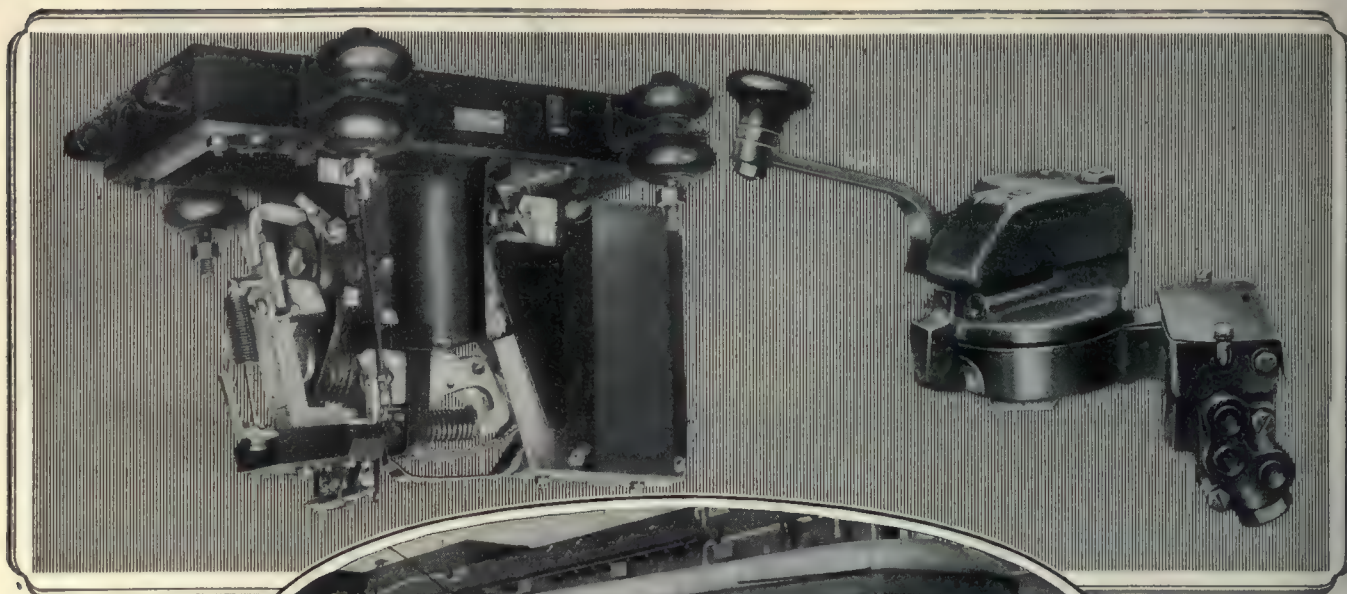
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420 line breakers *for one road*

The Kansas City Public Service Company recently inaugurated an extensive program of modernization. Clean, attractive, rehabilitated cars and speedier, more frequent service have increased the prestige and patronage of the road.



To help make the Kansas City cars as reliable as they are attractive, and to reduce maintenance expense to the minimum, 420 General Electric light-weight line breakers and 967 LB-4 control devices were selected—another example of wise buying.

GENERAL ELECTRIC

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Electric Railway Journal

McGraw-Hill Publishing Co., Inc.
JAMES H. MCGRAW, President

Consolidation of
Street Railway Journal and
Electric Railway Review

CHARLES GORDON
Editor

Volume 71

New York, Saturday, April 14, 1928

Number 15

Market Analysis an Important Part of Merchandising

WHILE discussions among electric railway men have for some time included the subject of merchandising transportation there still is a wide gap between the use of the term and its concrete application to the sale of transportation service. This is strikingly evidenced by the lack of definite information regarding the travel habits and preferences of the people in a given community.

In these days of keen competition and consequent need for intensive merchandising activity in the marketing of all classes of products, a market analysis has come to be recognized as one of the first essentials to scientific merchandising. The object of such a study is to acquire information regarding the number, location and buying habits of potential customers, and to determine the character of products and the nature of the appeals that may be expected to prove attractive to them.

Obviously, since this interest in the possibilities of merchandising transportation is of comparatively recent origin, "market analysis" is a strange term in the vocabulary of the electric railway industry. Nevertheless, it is highly important that transportation men understand the travel habits of those who do not use the street car or bus, so that they can study and learn the reasons why other modes of travel are being used and take steps to secure as much of this business as possible. Considerable interest, therefore, attaches to the survey of the riding habits of more than 100,000 persons in Detroit, made incident to the traffic survey in that city and discussed in the concluding article on this survey, published in this issue.

Questionnaires collected in eleven employment districts gave the place of employment, place of residence, mode of transportation used and reason, time required in traveling from home to work, and the number of blocks walked to and from mass transportation vehicles, if such were used. All of this information was classified for each of the eleven employment districts. It was classified, also, for 155 arbitrary residential sections and a chart was prepared showing how many of the total number tallied lived in each section, and the number using each type of transportation.

The charts prepared from the survey give a wealth of merchandising information. They show wide variations in the travel habits of the people in the several districts and illustrate the kind of market data that is needed to work out a really comprehensive transportation merchandising program. By using the information on the charts to check the actual transportation facilities provided, there is the opportunity for making service changes that will win increased patronage from those who for several reasons may be using other means of travel. The extent of this use of other agencies represents the

"unsold" market for public transportation. In sections where automobiles are used extensively increased speed and more attractive equipment may be the appeal needed to win riders. Where walking is the chief competitor, reduced headways and special fare concessions for short distances may prove effective. In each instance there is the opportunity for adjusting service to the requirements of a given section. After that, local advertising or selling effort may be directed toward the prospective riders on each transportation line, rather than dissipated in general appeals to an entire community.

The Detroit survey was made to determine the general causes of traffic congestion, and this analysis of travel habits was incident to that general objective. There was apparently no thought of a transportation "market analysis" in the minds of those in charge of the survey. But the information obtained and the way in which it was compiled illustrate rather strikingly the opportunity which exists for public transportation companies to apply scientific marketing methods to the problem of merchandising transportation service.

Indeterminate Franchise Measure a Bright Spot in New York Legislation

GOVERNOR SMITH was right, in the main, when he said that the session of the New York Legislature which drew to a close recently was the least fruitful one he had witnessed in 25 years. Out of the ruck, however, there did emerge some railway measures that may have an important bearing, particularly on the situation in New York City. Among them are the so-called Thayer bills. These companion measures amend the transportation corporation law and the railroad law by providing for terminable permits for stage, omnibus and motor vehicle lines and for street surface railroads. Under them a municipality would have the right to acquire by purchase all or any part of the property, plant and equipment of a stage, omnibus, or motor vehicle line, or of a street railway. Subject to the approval of the Public Service Commission or the Transit Commission, cities are empowered to grant terminable permits to operate stage, omnibus or motor vehicle lines, or street railway lines.

The prediction was borne out that the bill designed to extend relief to railways in paying for paving would fail of passage. A law was passed, however, giving the city of Ogdensburg the right to compromise its paving claim with the Ogdensburg Street Railway. Despite the passage of the so-called Mastick bill, intended to confer upon the Port Authority the power to deal with a comprehensive suburban transit plan, the Governor vetoed that measure.

The bills intended to further the railway unification plan of the city of New York were lost. One of these measures was drafted at the behest of the Transit Commission, presumably as a part of its work in carrying

out the Legislature's own mandate to it to prepare a plan for transit readjustment. The bill was iniquitous in that in reality it provided for a 5-cent fare perpetually, under the guise of authorizing the Board of Estimate and Apportionment of New York to appropriate funds and issue certificates of indebtedness to make up any deficit incurred.

Naturally, there has been some recrimination in New York City at the failure of the so-called city bills to pass. Samuel Untermyer, special counsel to the Transit Commission, deplors the failure of these measures, but Mayor Walker pretends not to be specially concerned about them since three or four more years must elapse before the system of rapid transit lines now under construction by the city and intended to be operated by the municipality will be ready to be put into service.

Apparently the Legislature was more alert than might at first be suspected, for, under the attractive bait of transit unification in New York, was poorly hidden another attempt to get rid of the fare requirement of the present law under which the city's municipal subway is being constructed. It will be remembered that the rate of fare on the municipal subway must after three years of operation be put at a figure sufficient to make the system self-supporting. A municipal system charging an 8 or 10-cent fare while privately operated companies are held to 5 cents, would have only one ultimate result—complete collapse of the city's untenable and ridiculous fare policy. Therefore the city administration made what appeared to be a somewhat casual effort to get rid of the requirement in the law which promises to become increasingly embarrassing as the municipal subway approaches completion. As long as the law remains as it is at present, continued effort may be expected to include the new municipal subway in some form of rapid transit consolidation. Any really sound plan must provide an adequate rate of fare. Since that is desirable from the standpoint of efficient transportation it is a good thing for the people of New York that the Legislature refused to "bite" on Mr. Untermyer's bait.

A New Bus Deal in Louisville

REAL co-ordination of the transportation services in Louisville is now assured. The Council has passed and the Louisville Railway has purchased a bus franchise that makes for co-operation not possible in the past. The grant is for twenty years. The provisions are published elsewhere in this issue. Like the railway franchise the new grant calls for the operation of the buses under the service-at-cost plan. This plan naturally possesses marked advantages where the matter of designating the amount and kind of service that are to be given is vested in the city.

The company at present has 30 buses available for use in a service which as now proposed contemplates the use of only 21 vehicles. It is to be expected, however, that this service will be augmented from time to time, particularly since Louisville has grown rapidly in recent years. Service somewhat similar to that now contemplated in the new grant has been given by the company in the past, but was largely the successor to that furnished by the original jitneys. The previous efforts of the company were hampered by the limitations under which it was permitted to function. It would appear now that all the previous handicaps have been removed.

That, of course, is a good thing for the railway, but it is a particularly good thing for the city since it insures operation by a responsible public servant capable under the principle of co-ordination and service-at-cost of functioning under proper supervision to the best advantage of the public. In short, the city has enrolled its name along with those other progressive municipalities in the United States which have recognized that transportation, properly supervised by governmental agencies, is a natural monopoly.

The Bus Is Finding Its Economic Place

APPLICATION of the Kansas City Public Service Company for a 15-cent bus fare raises anew the question of the economic place of the bus in city service. That there is a place—and a large one—for the automotive vehicle is today beyond question. But that place stands out with increasing clearness as one in which there must be an entirely different conception of service standards and rates of fare than exist for street cars. The bus is dependent for its major development upon assuming its place as a transportation agency in its own right and not as a mere substitute for existing services.

The bus-rail problem by no means stands alone in the history of transportation. When the railroads began to throw their steel bands across valley and mountain, the river barge was doomed to oblivion in the minds of many. Nevertheless the lower Mississippi last year carried the largest freight tonnage in its history. When the automotive triumvirate—the automobile, the truck and the tractor—began to change the habits of a nation, old Dobbin seemed destined for the glue factory. Yet hay is still an important farm product and harness makers don't complain for lack of business. It is one of the characteristics of transportation that demand increases with increased facilities, speed, convenience and comfort.

At present there is a wide gap between the cost, the convenience and the attractiveness of an automobile, and a transportation ride in the basic low-priced agency—the street car. Between these two limits there is a broad field into which the bus fits due to its inherent advantages. By giving a service at rates varying from 4 to 5 cents a mile, it becomes possible to offer convenience, attractiveness and comfort in city service at a price which can compete favorably with the private car or taxicab and which at the same time offers an attractive margin of profit. As parking difficulties and traffic congestion become more acute, the attractiveness of such service by buses is increased.

All this is not to say that there is no place for the bus in service of the feeder or supplementary type at rates of fare approximating street car rates, where the density of traffic does not justify the investment in rails. Under such conditions the rubber-tired vehicle offers an excellent expedient for reducing the losses that would be entailed in giving car service. But as experience with the bus increases it becomes clear that it is a mistake to establish bus operation on a large scale at rates which do not permit it to render the preferred class of service for which it is inherently fitted. Farsighted bus manufacturers today are devoting their attention to the economics of bus operation in a way which promises rapid expansion in the use of the new vehicle. They are concentrating upon the application of their vehicles in services

which will prove really profitable to the operator. In that objective they still encounter the competition of the salesman who has not yet learned that low fares, once established, are difficult to raise and that an unprofitable operation does not produce repeat customers.

The Kansas City move for a 15-cent fare directs attention again to the Pittsburgh operations in which a preferred form of transportation with buses was initially established at 25 cents and has since been expanded rapidly and profitably. The character of service offered attracts a very considerable number of riders who formerly operated their private cars regularly. The secret of the success achieved seems to lie in the fact that the character of the operation and the rate of fare charged have been properly balanced to give a service which is really attractive and self-supporting.

Saving Money by Spending It

SEVERAL interesting features are involved in the recently opened carhouse and storage yard of the Detroit Department of Street Railways on Coolidge Highway. According to an article elsewhere in this issue, the management estimates that savings approximating \$500,000 a year will be effected. That is a large sum, even for a system the size of Detroit's. An analysis of the reasons for it is of interest.

The major part of the saving comes from a reassignment of the cars of the Grand River Avenue line. Since the Jefferson Avenue cars have been running express the former through-routing of the two lines has been discontinued. It is estimated that assignment of the Grand River Avenue cars to the new station will effect a saving of \$225,000 annually through the elimination of waste car-miles. Other savings come from the arrangement of the storage tracks so that rotary movement of all cars can be obtained, reducing waste time for backing the cars out, and through the use of a portion of the property for storage of track and paving materials for distribution to locations on the west side of the city as needed.

One of the noteworthy items in connection with the selection of the site is that there has been an increase in realty values in the neighborhood. Years ago the erection of a carhouse depreciated the adjacent property materially. One reason for the difference here is that the railway management has followed the plan adopted by many theaters, hotels, and other business concerns which need entrances only on the main thoroughfare. The space reserved for the railway has only sufficient street frontage to provide entrances for the cars and space for the inspection building. The remainder of the property used for open storage of cars is at some distance back from the street, leaving the portion in front vacant. The department plans to resell a frontage of 663 ft. along Coolidge Highway, and it believes that the amount that can be realized will be nearly equivalent to that paid for the entire plot.

By attention to the details it thus has been possible to plan new facilities so that they do not add anything to the cost of the property. If the savings estimated are realized, the entire cost of land and building will be returned in less than one year. It takes relatively few projects such as this to spell the difference between success and failure in these days when the margin of profit is small.

Exaggerated Optimism May Disturb Business Stability

FUNDAMENTALLY, business conditions are sound. But the present industrial world has undergone a readjustment in recent years the portent of which is disconcerting in its magnitude. In an article on page 602 of last week's issue of the JOURNAL, Julius Klein, director of the Bureau of Foreign and Domestic Commerce, cites the fact that the mechanization of industry and war deflation has reduced the number of factory employees in the United States 917,000 since 1920. Added to this are decreases of 800,000 employees in agriculture and 240,000 on the railroads, making a total of approximately 2,000,000.

This trend has been quite apparent and has been widely discussed for several years. Not so widely recognized, however, has been the balancing effect of the rapid increases in non-manufacturing or service occupations cited by Dr. Klein. Automobile distribution and service, insurance, domestic appliances, education, motion pictures, barbers, hotels and restaurants have shown large increases in number of employees engaged. Thus the increased standard of living that has resulted from productive efficiency seems to be producing in considerable measure the demand for labor needed to balance the replacement of factory employees.

As Dr. Klein points out further, the first and indispensable safeguard of prosperity is to minimize waste, to concentrate every possible individual exertion toward widening the present rather narrow margin of profit by cutting in on production cost on the one hand and the expenses of distribution on the other. This advice is particularly significant since at this time the margin of profit in nearly every line of business shows unmistakable signs of growing narrower.

Closely related to business, of course, is the security market. There is always danger when the income return from stock investments crosses on its downward path the curve of the return from bonds. That point was reached long since. As that conservative commentator the *Financial Chronicle* says, prices on the Stock Exchange are being boosted with a rapidity and daring that is perfectly dazzling. Eventually securities must reach a level more nearly in line with their intrinsic worth, and that intrinsic worth is inexorably fixed by earning power. If the inevitable deflation of security prices is orderly, there may be no very grave consequences, but if the downward trend that follows is subject to anything like the violent gyrations of the upward movement, the consequences may be far reaching in their general effect.

Apparently, the country has been able to absorb some very heavy shocks. It would seem on the surface that there has been no other consequence than the rocking of the boat as a result of the Florida hurricane, the Mississippi Valley flood, the Ford suspension and the Presidential year unsettlements, but that is by no means certain. Again let it be said that business is sound, but it will remain so only as the responsible men in industry bend every effort to keep it so. And that presumes that they shall do everything within their power to discourage exaggerated optimism. Unbridled speculation in securities is a threat to stability. Wall Street is no less subject to abuse as a market than are other markets. It is in the abuse of the security market that the most immediate danger to industry seems to lie at this moment. Business prosperity is not helped by the hysteria of the gambler.

Modern Equipment Used for Instructing Toronto's Trainmen

This school has been provided to make the work of preparing new men for their duties easy. Old employees also attend the school and learn methods for doing their work better

By W. R. McRae

Superintendent of Rolling Stock and Shops
Toronto Transportation Commission, Toronto, Canada



Fig. 1—Platform showing standard car equipment



Fig. 2—Near view of equipment shown in Fig. 1

WHEN the city of Toronto took over the street railway from the Toronto Railway in 1921, and put responsibility of operation upon the Toronto Transportation Commission, the building used for the activities of the school of instruction was found unsuitable in many ways, and this important section, which has such a huge bearing on the success or failure of street railway operation, has for some time been located in suitable quarters.

The new premises, situated adjacent to the Hillcrest shops, which are centrally located, are thus convenient of access to employees from all carhouses.

In addition to the standard training of new platform employees the school of instruction is extending its usefulness to all employees, regardless of length of service or department.

Platform men of 20 or 30 years standing are making voluntary visits with a view to learning all they can of the equipment in use and a desire to clear up doubts regarding certain points. To date more than 60 per cent of the platform men (about 1,200) have visited the school of instruction, heard the lecture, and have had demonstrated to them the various pieces of equipment with which their work brings them in contact.

The benefits to be derived from a visit to the school appeal not only to platform men. Shed employees have attended in good numbers, and the clerical staff which deals with the correspondence, accidents, equipment, re-

ports, etc., has also attended lectures and gained knowledge which enables it to carry out duties more efficiently.

The school of instruction is in charge of Chief Instructor Grant, who is assisted by six instructors. A better understanding of the school may be obtained by reference to the illustrations, which show the equipment in considerable detail. The following paragraphs give a brief explanation of this apparatus:

An important piece of equipment is a raised platform, Fig. 1 and Fig. 2, at one end of which is mounted in relative position the equipment as in the vestibule of a standard Peter Witt car. Near the middle is located a conductor's stand as in a three-door trailer. This layout was chosen because in addition to having the usual equipment of farebox, change counter, door control levers, signal lights, etc., it also has the movable barrier which permits of using the middle door as either entrance or exit. This unit is not a "live" one, but is used to familiarize the student with the appearance and location of the various pieces of the equipment. It also teaches him the purely mechanical movements necessary in handling the controller, motorman's brake valve, etc. The movable barriers used to represent doors are provided with switches in circuit with the control switch and motorman's signal lights so that the door interlocking features may be demonstrated. A supply of compressed air permits gage indications to be shown.

At the rear end of this platform, Fig. 3, is a struc-

ture on which is mounted a Tomlinson coupler, with a drum switch and air cocks. A second Tomlinson coupler makes it possible to demonstrate how the cars, air lines and electrical circuits are connected and disconnected.

Those cars not equipped for train operation are not fitted with Tomlinson couplers, an adapter being used in order to couple the standard Victor drawbar to the Tomlinson coupler. The Victor drawbar head and the adapter are shown in the foreground of Fig. 3. Their use is illustrated in Fig. 4.

Figs. 5 and 6 show the side and end views respectively of a platform upon which is mounted a complete equipment of safety devices, including a treadle-operated exit door. The controller, motorman's valve, etc., are arranged so that the operator faces the equipment and can see the action of the brake cylinder, line switch, treadle door and sanders. For this last a board is provided with a pointer showing sand "on" and "off."



Fig. 3—Demonstration equipment for coupling cars

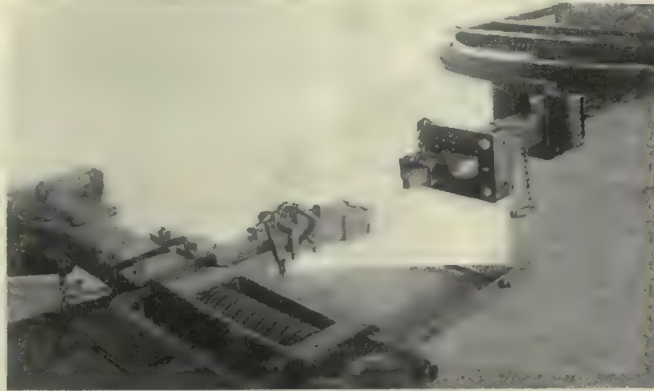


Fig. 4—Use of adapter for connecting automatic and non-automatic couplers

A white lamp, located at the line switch, lights when the switch closes, and a red lamp at the brake cylinder lights when the piston moves out. Both lamps are in line with the operator's eye and serve to impress upon him that when an emergency application of the brake is made from the controller handle, the power is cut off and the brakes applied as well.

Midway on this platform is a unit representing a section of the side of a car with which is mounted a Peter Smith hot air heater with the intake exposed, and a short section of air duct showing how fresh air is drawn from outside and circulated through the car after heating. A standard ventilator is fitted to the roof section and appropriate notices

give details of the amount of fresh air handled by each.

One of the simplest but most useful pieces of equipment of the school is shown in Fig. 7. This is a board on which are painted some simple circuits. The upper diagram of the control circuit through the door interlock

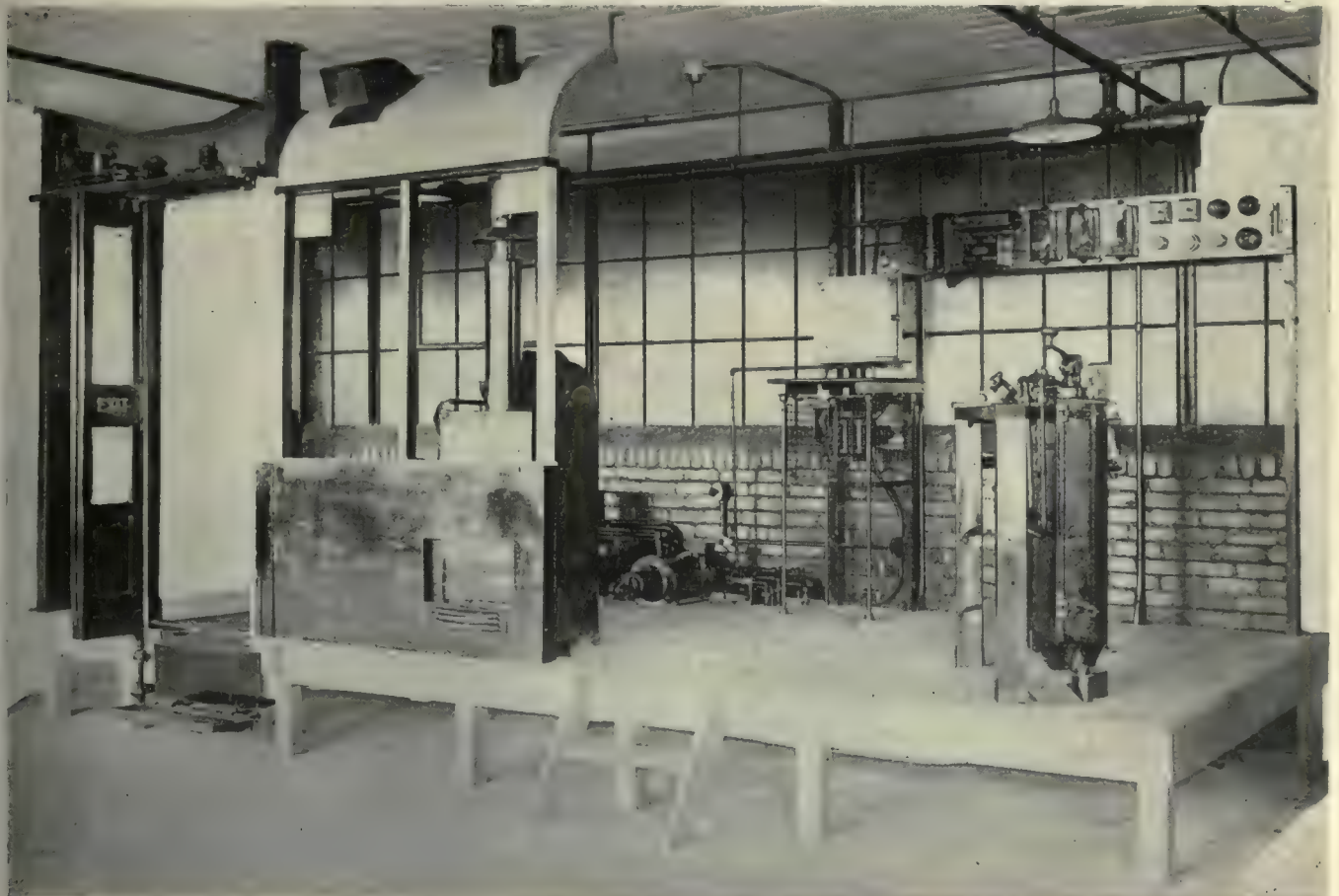


Fig. 5—Platform equipped with full set of safety devices

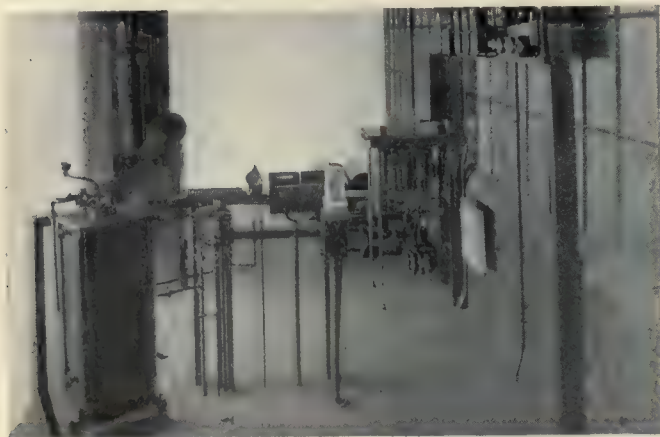


Fig. 6—End view of the safety device exhibit shown in Fig. 5

switches, etc., illustrates clearly by means of a small wooden bar, which represents the blade of the emergency switch, how, in the event of a failure, the coupler, door switches, etc., can be cut out and a separate feed from trolley secured in order to keep the car moving. The two lower diagrams to the left show the series-parallel arrangement of the motors, and by means of movable dummy switches the action when the controller cutout switches are used is illustrated. At the lower right-hand side is a standard diagram of the various car circuits.

Fig. 8 shows the demonstration board on which the more common failures of the electrical equipment are illustrated, with instructions as to the proper steps to take to get the car moving. On this board are mounted four electric fans and four small lamps, representing the armatures and fields, respectively, of four motors. A number of lamps to represent the rheostat and a line switch are also installed. The board is appropriately painted to show the conduits and wiring to the motors and rheostat; the whole is regulated by a K-6 controller, together with the necessary control switch fuses, etc. Concealed snap switches are mounted behind the board

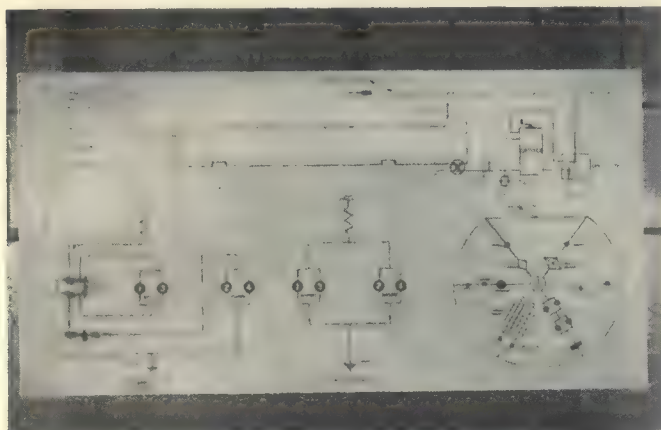


Fig. 7—Simple circuits of motors and equipment of a modern car

with the stems projecting through to the front. Small pointers fastened to these stems under the buttons are painted in uniformity with the lines representing the wires.

The student comes to this board from the one previously described, and is, therefore, familiar with the series-parallel arrangement of the motors. Here he is shown normal operation first. After closing the control switch and getting signal lights, the controller is put on

the first notch and the line switch is seen to close. The whole rheostat is shown in circuit, and the four motors start slowly. In a similar way all the steps to the full parallel position are illustrated.

For demonstrating defects, two of the concealed switches are used to illustrate open motor leads. Two show grounded motors, two more show defects in the rheostats—one a ground, the other a broken grid. Open leads are demonstrated by turning the switch pointer through 90 deg. showing a break in the painted line representing the wire. As the controller is notched up



Fig. 8—Demonstration of common failures of electrical car equipment

the second motor of the pair with a broken lead is seen to spin very fast, while the other two motors run comparatively slowly.

Grounds are illustrated by turning the pointer to register with a ground wire painted on the board, and the student is instructed that the current, instead of following its normal path through the motor, takes the easier path to ground through the defective insulation at the point illustrated. Two concealed snap switches behind the switchboard to the left, for the instructor's use, illustrate how the line switch will open when a ground has occurred, one for the series notches and the other for the parallel. For example, with a ground in No. 1 motor, the instructor turns the first concealed switch as well as the pointer illustrating the ground. On turning the controller handle the line switch closes and the rheostat is shown alive, but due to the ground there is no movement of the motors. Advancing the K-6 controller to third position results in the line switch opening. The student is then shown how to cut out the defective motor.

The armature shown in Fig. 9 is used to let the student see what damage may result from improper handling of



Fig. 9—Armature used to illustrate damage from improper handling. In the rear is a complete lifeguard



Fig. 10 (at left)—A flat wheel is shown, together with a chain removed from the track groove. Fig. 11 (at right)—Models of an electric track switch, various controllers, trolley pole, catcher, fuse box and rheostat

the car or failure to cut out a defective motor. The instructor adds a few words relative to the expenses incurred and loss of revenue incidental to failures of this kind. An H-B lifeguard is also seen in this view. It is mounted so that all parts are clearly visible and its working can be explained easily.

A cast-iron wheel with a flat spot is shown in Fig. 10. The instructor remarks on the cost of flat wheels and their prevention. The piece of chain hanging on the stand is a sample of the material which finds its way into the groove of the rail, doing a great deal of damage to wheel flanges if not removed promptly.

Of the four units shown in Fig. 11 one is a model of the electric track switch which is standard on this system and is used to demonstrate how in the event of the switch failing to work a link may be removed allowing the tongue to move independently of the actuating mechanism.

This link in the model is painted red. Another is a stand on which are mounted a K-10 and an English Electric Company Q-2 controller. In the corner is a stand on which are mounted a trolley pole and base with rope and catcher, a trolley fuse box and a section of rheostat. The last is a set-up to which a supply of air is connected, which is used to demonstrate the working of the automatic brake slack adjuster. A white mark painted on the piston sleeve indicates standard piston travel. Then some slack is introduced in the system and the action of the adjuster noted.

Fig. 12 shows the seating plan in the class room. In this room are the standard schedule and notice cases and a section of a "signing in" desk, all as used in the various carhouses of the system. On the walls are frames containing sample transfers, badges, etc., together with a large map of the city.



Fig. 12—Seating arrangement in the class room

Purchase of Tientsin, China, Street Railway a Problem

Chihli state government, while contemplating the purchase of the system, objects to the railway company's sale price

By H. O. KUNG

*Secretary the Chinese Engineering Society
American Section*

PURCHASE of the street railway system in the city of Tientsin, the "Chicago" of China, is proving a difficult problem for the Chihli state government. The present company operating the street railway system demands a price fifteen times the average annual profit of the three preceding years, which the government is unwilling to pay.

The provisions of the franchise concerning distribution of profits and the purchase of the system by the government are peculiar. The purchase terms involve the profit earned by the company, and the profit to be retained by the operators, in turn, is determined by investment. Since the owners have never disclosed the true investment figures, the government officials are unable to arrive at a correct purchase price. The whole problem has now resolved itself into evaluating the street railway properties.

The city of Tientsin, the great trade center of north China, is about 80 miles southeast of Peking, the capital of the Chinese Republic. A few generations ago Tientsin was a very small town, but now it has a population of more than 900,000. Of this number 1 per cent are foreigners, most of whom are engaged in trading, either importing or exporting. All the street construction and trade buildings are modern, except those within the former city walls. Tientsin resembles in many respects the American cities of Cincinnati, Ohio, and Pittsburgh, Pa.

FRANCHISE OUTLINES DETAILED METHOD OF DISTRIBUTING PROFITS

The street railway was constructed in 1904 by a Belgian trade company, which also installed the power and light distribution system for the city. The nominal capital has been given as \$1,000,000, but the actual investment of the company is unknown to the state government officials. The company paid \$5,500 to the Chihli government for the issue of a franchise for a period of 50 years. A detailed system of distributing profits was outlined in the franchise tendered the railway, as follows: The company shall contribute each year to the Chihli government a sum which shall be $3\frac{1}{2}$ per cent of the gross revenue and may earn a legal profit of 12 per cent on the investment. If any profit should remain after deducting for expenses and maintenance, 12 per cent of the amount shall be contributed to the government as royalty. Dividends on the stock may then be paid up to 15 per cent of par. Should any balance remain undivided after paying the 15 per cent dividends, 20 per cent of this remainder shall be paid the government and 20 per cent retained by the company as surplus.

According to the general contract, the Chihli government may purchase the properties of the operating company after the first twenty years of service at a price which shall be fifteen times the average annual profit of the three immediately preceding years. In no case shall the price be less than all the expenses for con-

struction and installation of the entire system, including buildings, trolleys, tracks, machinery and equipment. Should the Chihli government not purchase the properties of the operating company at the end of the first twenty years, a seven-year extension service shall be allowed to the same company. After 50 years of service however, all the property shall be transferred to the government free of charge and in good condition.

It is obvious that the operating company would hold a decided advantage should the Chihli government decide to purchase the road at the end of the 49-year period. However, should the government await the termination of the 50-year period, the tables would be turned. The general contract was signed on April 26,

GROSS REVENUE, EXPENSES AND PROFIT FOR 1922, 1923 AND 1924

Year	Gross Revenue			Expenses	Profit
	Street Railway	Lighting	Total		
1922.....	\$845,529	\$1,387,519	\$2,233,048	\$775,399	\$1,457,649
1923.....	854,075	1,586,397	2,440,472	749,974	1,690,498
1924.....	872,308	1,766,176	2,638,484	784,325	1,854,159

1904, and the franchise for furnishing electric energy and street car services will be legally terminated in 1954. The seventh elapsed period would terminate in 1953.

The financial conditions of the operating company for a few years past are extremely interesting. The gross revenue, expenses and profits for the year 1922, 1923 and 1924 are shown in an accompanying table. The average annual profit for this period was \$1,667,435, so that the purchase price, figured according to the terms of the contract, would be \$25,011,525. It is quite natural that there should be disagreement between the company and the government over the "fifteen times yearly profit" clause.

The general contract provides that the Chihli government may acquire control of the company's property if it can be found that the company has earned any illegal compensation. As a result of several months investigation conducted by a special committee, the operating company has been found to have earned illegal profits. On the basis of this discovery, the government assumed control of the property in August, 1927, and demanded a purchase price to be set by the company. The company complied with the request and in a note sent to the government claimed \$26,305,395 as the purchase price of the entire property. This amount the government has refused to pay. Because the purchase price is determined from the average annual profits over a three-year period, and since the amount of profit to be retained by the company is determined by the actual investment in the property, there has been a further dispute over the actual amount invested in the property. The government has set about to determine a reasonable valuation from which it can establish a true purchase price.

To arrive at such a reasonable valuation the following three elements should be considered and given their proper relative weight in determining the final price: First, the actual and historical investment of the company should be disclosed to the appraisal engineers; second, the market value and the amount of the outstanding stocks and bonds also should be disclosed; third, a brief but complete financial statement of the company for each year, from the first year of operation to the present, should be presented. Based upon these three elements in applying the equal profit ratio depreciation method a just valuation of the company's properties may be determined.



One of the 50 light-weight city cars bought by the Springfield Street Railway last year

Million Dollar Rehabilitation *at Springfield*

Purchase of new cars and new buses, extensive track reconstruction, and increase in shop and garage facilities are among the improvements made during the past year. Further track reconstruction planned for coming season

MORE than a million dollars was spent by the Springfield Street Railway, Springfield, Mass., in the improvement and rehabilitation of its property during 1927. This was one of the first big steps in the plan of the New York, New Haven & Hartford Railroad to modernize the street railways which it controls. The rehabilitation was not undertaken from altruistic motives, but for fundamental economic reasons. Investigation convinced the management of the New Haven that the street railway is now, and will remain for a long while to come, the backbone of the local transportation service in Springfield. The officials of the railroad believe that transportation, like any other commodity, cannot be produced economically with obsolete equipment. Furthermore, it is their belief that transportation service should be made attractive. You cannot sell a man what he does not want. With these thoughts in mind, an extensive program of improvements was undertaken. Some of them have already been carried out, and others will be made during the present year.

Approximately \$800,000 was spent last year for 50 new light-weight city cars. Before the purchase of these cars the company had been engaged in the development of an experimental car in collaboration with the Wason Manufacturing Company. This experiment was one of the outstanding developments in the electric railway industry last year. So many radical features were included

in this new design, however, that it was considered undesirable to adopt it for a large order of cars before these new departures had been thoroughly tried out in actual service. The lot of 50 cars bought last year, therefore, were designed along more conventional lines. They were described in detail in *ELECTRIC RAILWAY JOURNAL* for March 26, 1927.

The company also bought nine new buses last year. Of these three were 29-passenger Yellow coaches model Z. Six were Macks of the same seating capacity. All the new buses are being used on city routes in Springfield, taking the places of older buses which have been transferred to lighter traffic routes in outlying districts. In all, the Springfield Street Railway is now operating 41 motor coaches. The former freight station has been converted into a garage. Owing to the discontinuance of through electric railway operation between Worcester and Springfield, freight service had been abandoned and the former freight station became available for other uses.

More than \$300,000 was spent for track improvement last year. The program was planned after a careful survey of the property had been made to determine what reconstruction work was needed. On account of increasing traffic and to speed up the service a considerable amount of double-tracking was undertaken. In all 1.78 miles of new track was added to the system and 6.07

Job No.	Location	Work Done	Distance Ft.	Date Built	SUMMARY OF TRACK WORK			
					Rail	Old Construction Ballast	Paving	
1	Belmont Ave., X to E. Longmeadow line	Replacing single track with double track	5,000	1896-1901	7-in., 70-lb. T	None	Bituminous	
2	Sumner Ave., Lenox St. to Lyndale St. Double-track crossing at X.	Replacing single track with double track D.T. crossing, two branch-offs, three cross-overs.	2,500	1896-1901	7-in., 70-lb. T	None	Bituminous	
3	State Street, Oak to Hancock.....	Reconstruction of double track.....	1,200	1910	9-in., 125-lb. girder	Sand on 6-in. con.	Wood block	
4	State Street, Benton to Pine Point.....	Reconstruction and raising grade of double track 3 in.....	4,200	1902	9-in., 107-lb. girder	Dirt	Hassam	
5	Berkshire Street, West from Page Blvd.	Reconstruction of outbound track.....	2,700	1902	7-in., 70-lb. T	Gravel	Water-bound	
6	Berkshire Street, Page to Holly.....	Reconstruction of double track.....	2,700	1902	7-in., 70-lb. T	Gravel	Water-bound	
7	Main and Oak Streets, Indian Orchard	Installation of double-track branch-off	.....	.....	.....	.....	.....
8	Memorial Square.....	Installation of single-track branch-off...	.....	.....	.....	.....	.....
9	Main St. (W. Springfield) Park to Burford	Reconstruction of single track.....	3,024	1901	6-in., 60-lb. T	Gravel	Water-bound	
10	Chestnut and Carew, and Plainfield and West.....	Installation of two electric track switches Reconstruction of single track.....	1,580	1894	6-in., 60-lb. T	.....	Macadam	
11	Carew Street, Main to Chestnut.....	Reconstruction of single track, with branch-off to Liberty.....	1,350	1904	9-in., 107-lb. girder	Gravel	Granite block	
12	Chestnut Street, Liberty to Linden.....	Reconstruction and relocation of track and overhead on state highway.....	4,000	.....	.....	.....	.....
13	Woodlawn (West Springfield).....	Double track extended.....	300	.....	.....	.....	.....
14	Maple Street (Agawam), O'Briens Corner to Bridge Street.....	Relocation of track.....	3,500	.....	.....	.....	.....
		Constructing new track.....	1,600	.....	.....	.....	.....

miles was rebuilt. Thus work was co-ordinated with the city's paving plans. Similar improvements will be made this year.

The work that was done covered nearly all lines in the system, as may be seen from the accompanying map. It comprised fourteen major jobs, which are indicated by numbers on this map and in the table which presents a summary of the work.

REASONS FOR REBUILDING

Single track on Belmont Avenue from the intersection of Sumner Avenue to the East Longmeadow line, a distance of about 5,000 ft., and on Sumner Avenue from Lenox Street to Lindale Street, about 2,500 ft., was replaced with double tracks. At the intersection a double-track crossing consisting of sixteen frogs, a single-track connecting branch-off, a single-track right-hand branch-off and three cross-overs were installed. On the map this work is indicated as jobs 1 and 2. The old 7-in., 70-lb. T-rail which was laid in 1896 and 1901, without ballast and in bituminous macadam, was removed. The new track replacing it was constructed with 7-in., 103-lb. girder rail installed on new ties on ballast of 6 in. of trap

rock. The new paving consists of 3 in. of asphalt on 6 in. of concrete. The work cost \$125,000 and took 63 working days to complete.

On State Street between Oak and Hancock Streets 1,200 ft. of double track was reconstructed. The old construction used 9-in., 125-lb. girder rail, which was installed in 1910 with sand ballast on a 6-in. slab of concrete. This was taken out and new 7-in., 103-lb. girder rail was put in. Here the sub-grade was not the same but trap-rock ballast was substituted for sand and a 6-in. concrete base was installed for the new asphalt pavement. This piece of work cost \$16,350 and was completed in fourteen working days.

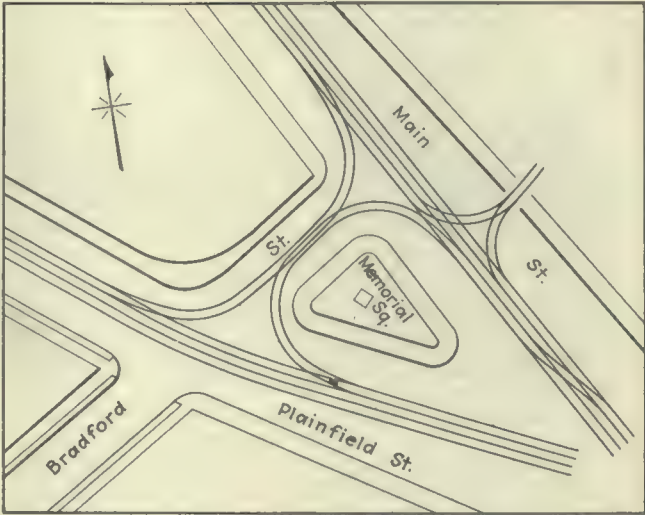
Farther out on State Street, from Benton Street to Pine Point, the city repaved with asphalt, using the old cement-macadam paving as a base. It therefore became necessary to raise the company's tracks 3 in. for a distance of 4,200 ft. New 7-in., 103-lb. girder rail was laid on steel ties in concrete with a 6-in. concrete base for the asphalt pavement, replacing the old 9-in., 107-lb. girder rail which was installed in 1902 and was laid on dirt ballast. The time taken for this work was 37 working days and the cost was \$61,400.



New Yellow Coach at the Court Square terminal

AT SPRINGFIELD, MASS.

	New Construction		Working	Cost
	Ballast	Paving	Days	
10 lb. girder	6-in. trap rock	3-in. asphalt on 6-in. concrete	63	\$125,000
10 lb. girder	6-in. trap rock	3-in. asphalt on 6-in. concrete	..	.....
10 lb. girder	Trap rock	Asphalt on 6-in. concrete	14	16,350
10 lb. girder	Steel ties in concrete	Asphalt on 6-in. concrete	37	61,400
10 lb. T	6-in. trap rock	Asphalt on 6-in. trap rock	10	12,175
10 lb. T	6-in. trap rock	Asphalt on 6-in. trap rock	21	30,000
.....	6-in. trap rock, rolled	3-in. asphalt on 6-in. concrete	..	6,300
.....	6-in. trap rock	3-in. asphalt on 6-in. concrete	21	7,000
1-lb. girder	6-in. trap rock	3-in. asphalt on 6-in. concrete	13	18,000
.....	.....	.....	..	665
10 lb. girder	6-in. trap rock	3-in. asphalt on 6-in. concrete	6	8,600
10 lb. girder	6-in. trap rock	3-in. asphalt on 6-in. concrete	..	8,000
.....	.....	.....	..	8,200
.....	.....	.....	12	10,600
.....
.....	.....	.....	.....	\$312,290



An unusual looping arrangement installed at Memorial Square

The outbound track on Berkshire Street, westward from Page Boulevard, 2,700 ft. long, was rebuilt. The old 7-in., 70-lb. T-rail which was taken out was installed in 1902 on gravel ballast, the paving consisting of water-bound macadam. The new track was laid with 6-in., 100-lb. T-rail on 6 in. of trap-rock ballast. This work cost \$12,175 and took ten days.

Beyond Page Boulevard, as far as Holly Street, 2,700 ft. of double track on Berkshire Street was rebuilt with 6-in., 100-lb. T-rail, replacing the old 7-in., 70-lb. T-rail which was installed in 1902. The same method of con-

struction was followed as on the job previously mentioned. This work took 21 days and cost \$30,000.

The special work indicated on the map as job 7 is a double-track left-hand branch-off, installed at Main and Oak Streets, Indian Orchard. Trap-rock ballast rolled to a depth of 6 in., and a 6-in. concrete paving base with a 3-in. asphalt top dressing has been used. This work



Fourteen track reconstruction jobs were done in Springfield, Mass., last year at a cost of \$312,290



New double track on Sumner Avenue east of Belmont Avenue



Double track installed on Belmont Avenue to speed up the service on a heavy traffic line

cost \$6,300. An unusual installation made at Memorial Square is a single-track connected branch-off with gauntlet construction. Memorial Square is a terminal of several lines and this loop was installed to facilitate the turning of cars. The track was ballasted with 6 in. of trap rock and 3 in. of asphalt top dressing on a 6-in. concrete base. The work cost \$7,000 and was completed in 21 working days. This is indicated as job 8. The single track on Main Street, West Springfield, from Park to Burford Avenue, 3,024 ft. long, was rebuilt. The original track consisted of 6-in., 60-lb. T-rail installed in 1901 with gravel ballast and water-bound macadam paving. This was replaced with 7-in., 103-lb. girder rail with 6-in. trap-rock ballast and a 6-in. concrete paving base. The job cost \$18,000 and was done in thirteen working days. It is indicated as job 9 on the map.

At Chestnut and Carew Streets and at Plainfield and West Streets two electric switches were installed at a cost of \$665. On Carew Street, from Main Street to Chestnut Street, 1,580 ft. of single track was rebuilt. The old 6-in. 60-lb. rail which was installed in 1894 was replaced by 7-in. 103-lb. girder rail. The old paving was macadam and the new rail was laid on 6-in. trap-rock ballast and 6-in. concrete base for the paving. Six working days were consumed in doing the work which cost \$8,600.

Reconstruction of 1,350 ft. of single track on Chestnut Street, from Liberty Street to Linden Street, and also renewing right-hand branch-off into Liberty Street was done in six days at a cost of about \$8,000. New 7-in. 103-lb. girder rail with 6-in. trap-rock ballast and 6-in.

concrete base for paving was installed in place of the old 9-in. 107-lb. girder rail installed in 1904, gravel ballasted with granite block pavement on a sand base. On the Westfield-Springfield line on account of the relocation of the state highway about 4,000 ft. of single track was shifted and the double track extended a distance of 300 ft. The job cost \$8,200.

Relocating 3,500 ft. of track on Maple Street, Agawam, from O'Brien's Corner to Bridge Street and constructing 1,600 ft. of track on Maple Street, from Bridge Street to Walnut Street, Agawam, on account of the construction of a new highway, took twelve days and cost \$10,600. It shortened the distance of the Feeding Hills line 3,500 ft.

Cincinnati Finds Foremen's Conference Helpful

UNDER the leadership of E. J. Jonas, superintendent of equipment, foremen's conferences are being conducted monthly by the Cincinnati Street Railway for the heads of the mechanical department. These meetings are attended by the assistant superintendent of shops, the equipment engineer, the general foreman, and all shop and carhouse foremen. As a rule the day foremen get together in the morning while the night foremen meet on the evening of the same date. An occasional joint meeting is scheduled, at which the attendance is 30 or more.

The meetings are usually opened with a constructive talk by the chairman or a guest. At times a special subject—such as accidents, pull-ins, economy or supervision—is assigned in advance of the meeting. This gives the members an opportunity to come prepared to discuss such subjects fully. These constructive talks and discussions have proved to be well worth while.

Time is provided on the program for each member to bring out suggestions, problems and tests of various kinds on which he has been working. These are discussed, committees are appointed to make further investigation, or any other necessary action is taken. In this way each member gets to know what the others are doing and how they are going about it. Many subjects come up in this way that are of general benefit to the entire department.

Car-miles per pull-in increased about 61 per cent in the last four months of 1927 over the same period of the previous year. This upward trend is continuing, and the improvement is attributed largely to the effect of these meetings.



New track on State Street laid in conformity with the city's paving program



Even though an automatic traffic signal is provided at this intersection pedestrians are using all crosswalks

Detroit Survey

Develops Basic Traffic Data

Commercial vehicles use only a few routes. Jaywalking and crossing against the red traffic lights are common practices. Extensive survey of travel habits shows wide variations in modes of transportation used

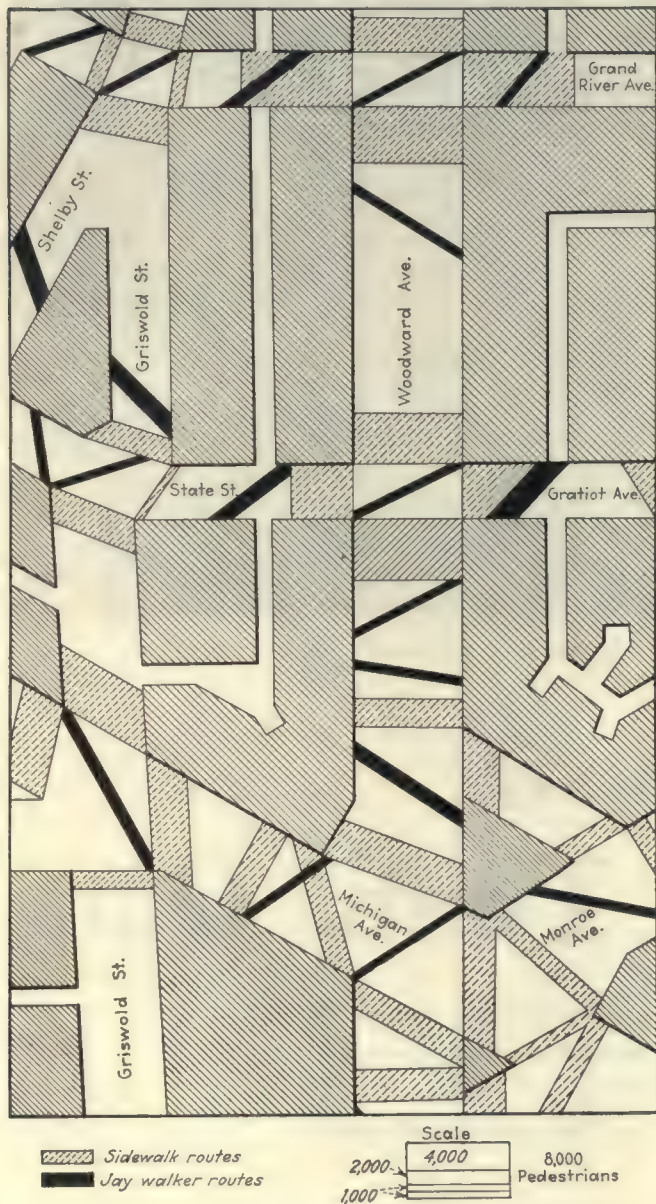
PART TWO

Unfavorable conditions existing in the alleys of Detroit, the parking situation, vehicular traffic flow and the movement of passenger transportation vehicles were covered in Part One, which appeared in the April 7 issue of this paper. The second and final article treats of commercial vehicle movements, regulation of pedestrians, the causes of accidents, a survey of travel habits, and suggestions for traffic improvement submitted by citizens.—EDITOR.

FREIGHT vehicles, being slow moving, impede the general movement of traffic to a considerable extent. Traffic congestion has been laid at the doors of the freight vehicles, and it has even been suggested that horse-drawn vehicles be prohibited in some districts during certain times of the day. Valuable information on the use of freight vehicles was obtained from several wholesale and retail merchants. A total of 5,435 commercial vehicles were owned and rented by the merchants who replied to the questionnaires. Of these 1,308, or 24 per cent, were horse drawn. Only 677, or 12.4 per cent, of the total horse-drawn vehicles were in use during the normal working day, so that they were not considered an important factor in the traffic situation.

The origin, route and destination of freight-carrying vehicles to and from the principal freight station within the downtown business district was the subject for another survey. A marked tendency was revealed for freight vehicles to move over a few selected routes. Other routes were available and just as short, but freight truck drivers found them less desirable to use, either because the paving was in poor condition or because parking interfered with the movement of their vehicles. The report recommends that freight pick-ups and deliveries be confined to the night hours in so far as practicable. This plan not only would speed up general traffic during the daytime, but also would prove economical for the trucking interests. The lack of spaces in which to park for unloading and picking up freight results in costly cruising. Of equal importance with the delivery and pick-up of wholesale freight is that of vehicles engaged in retail delivery. Though there is a marked diffusion of delivery routes, there is a natural tendency to follow the best and main arteries.

Traffic movement is hampered by cruising, as it is generally termed. Three types of vehicles indulge in this practice: private automobiles, trucks and taxicabs. Cruis-



Detroit has its share of the jaywalking habit, a pedestrian count revealed

The chart shows graphically the relative jaywalker and cross-walk movements. Of 293,195 pedestrians tallied, 27,521, or 9.4 per cent, were offenders. Detroit accident statistics showed that of the total pedestrian accidents, 42.4 per cent of the fatalities and 54 per cent of the injuries involved jaywalkers.

ing is classified in the report as a high-class nuisance and a very distinct obstruction to traffic movement. To determine the amount of cruising at certain locations in the downtown district, tallies were made which revealed that it assumes surprising proportions. To remedy the taxicab situation it was suggested that more stands be provided and that automatic control boxes be installed.

REGULATED PEDESTRIAN TRAFFIC MOVEMENT NECESSARY

Impatience is a pronounced pedestrian characteristic at controlled intersections, and the unwillingness to proceed in accordance with the signal indication is clearly shown in a survey made. The tally showed that of 12,566 pedestrians using a principal intersection, 44.33 per cent ignored the safety feature of the traffic signal and crossed through the traffic. Fatalities and injuries are very material from this cause, since the actual street hazard is 2½ times as great when crossing against the red signals. Pedestrian subways, overhead bridges, automatic control devices, marked lanes on the sidewalks and other means of bringing relief have been suggested, but their practicability is questionable.

Another survey of pedestrian traffic movement showed that of 293,195 pedestrians tallied, 27,521, or 9.4 per cent, were jaywalkers. This figure might seem insignificant, but of the total pedestrian fatalities and injuries in Detroit, 42.4 per cent of the fatalities and 54 per cent of the injuries were directly traceable to this class. The jaywalker not only endangers his own life and the lives of others, but he also interferes materially with the movement of traffic. Remedial measures should be applied through educational channels, and regulation resorted to only when it becomes necessary.

Surveys of the number of pupils attending 40 public schools and the respective places of residence were compiled from the records of the Board of Education. The present methods of protecting the children while crossing the streets were determined from a field survey, which revealed that there was a need for additional protection. Suggested means for school locations were the installation of more automatic traffic signals, the use of pedestrian subways and the stationing of more policemen.

Information gathered by the Accident Investigation Bureau during the first four months of 1927 gives the details of 146 accidents involving 185 persons. Of these totals, 80 accidents involving 94 persons occurred in unprotected safety zones, one accident involving one person occurred in a protected safety zone and 65 accidents

TABLE I—MODE OF TRANSPORTATION USED BY PERSONS LIVING IN DIVISION NO. 81 TRAVELING TO EMPLOYMENT DISTRICTS A TO K INCLUSIVE, CITY OF DETROIT

Type of Transportation	Districts											Total
	A	B	C	D	E	F	G	H	I	J	K	
Walking.....	17	..	16	3	19	4	50	3	5	103	5	697
Driving automobiles.....	6	..	13	..	3	2	12	1	2	..	1	227
Hiding in friend's automobile.....	40	..	5	4	190	21	140	14	..	237	6	657
D. S. R. cars, no transferring.....	..	..	..	..	1	..	3	..	1	11	..	16
D. S. R. buses, no transferring.....	..	..	..	..	..	..	..	..	..	..	..	0
D. U. R. cars, no transferring.....	..	..	..	..	..	..	..	..	..	..	..	0
D. U. R. buses, no transferring.....	2	..	..	..	4	1	21	1	3	61	..	93
Detroit motor buses, no transferring.....	..	..	..	..	5	2	..	..	..	53	..	63
Jitney, no transferring.....	..	..	..	..	..	..	..	..	..	..	..	0
Buses not listed, no transferring.....	..	..	..	..	..	..	..	..	..	..	..	0
Steam trains, no transferring.....	..	..	..	..	..	..	..	..	..	..	..	0
D. S. R. cars to D. S. R. cars.....	68	36	..	14	16	2	65	3	28	31	25	381
D. S. R. cars to D. S. R. buses or vice versa.....	19	..	..	..	..	..	..	..	1	3	..	23
D. S. R. cars to D. M. B. buses or vice versa.....	..	..	..	..	1	1	7	..	..	2	..	0
Other public service vehicle to any other public service vehicle.....	3	..	..	..	..	..	..	..	..	..	..	14
Total.....	155	36	35	21	241	73	903	67	40	501	43	2,115



Distribution by residence divisions of 80,000 persons leaving the downtown district between 5 and 6 p.m., with mode of transportation used

The insert shows how the detailed information of the mode used is shown on the map. A chart of this nature is particularly interesting to public transportation operators, since it indicates the travel habits of residents in every section of the city moving to and from any particular employment section. The areas of population increase and decrease show a movement from the closer-in section to the outer districts. Population figures were not available for seventeen districts.

involving 90 persons were caused by vehicles colliding with protected safety zones. Of the 65 collisions with protected safety zones, 59, or 90.8 per cent, occurred from 6 p.m. to 6 a.m., a large proportion of which was considered chargeable to improper illumination. Corrective measures are being adopted through the installation of base lamps on the lighting posts in the safety zones. It was suggested that the ordinance requirement of "no parking opposite safety zone" be amplified to include a space of at least 30 ft. at both ends of all safety zones and car stops.

TABLE II—SUMMARY OF PERSONS TALLIED IN ELEVEN EMPLOYMENT DISTRICTS, DETROIT, MICH.

District	Area	Totals				Per Cent		
		Number Tallied	Walking	Using Auto-mobiles	Using Mass Transportation	Walking	Using Auto-mobiles	Using Mass Transportation
A	Ford River Rouge Plant.....	17,920	962	4,089	12,869	5.37	22.82	71.81
B	Kentucky-Rome-City Limits.....	536	147	147	306	15.48	27.42	57.10
C	Toledo-Junction-Michigan-Hubbard.....	5,900	1,062	1,496	3,342	18.00	25.36	56.64
D	Crawford-Lafayette-21st-P.M.R.R.....	4,500	1,050	929	2,521	23.33	20.64	56.03
E	Highland Park.....	11,530	2,802	1,328	7,400	24.30	11.52	64.18
F	Antoinette-Third-Custer-Woodward.....	3,288	817	711	1,760	24.85	21.62	53.53
G	John R-Custer-Helen-Kirby-Trombley.....	18,766	4,708	3,730	10,328	25.09	19.88	55.03
H	Hamtramck.....	615	158	148	309	25.69	24.07	50.24
I	St. Antoine-Lafayette-East Grand Boulevard-Detroit River.....	5,215	1,142	644	3,429	21.90	12.35	65.75
J	Loop District.....	24,609	1,229	4,934	18,446	4.99	20.05	74.96
K	Canfield-Gray-East Jefferson-Hart.....	8,662	2,881	1,214	4,567	33.26	14.02	52.72
Total.....		101,541	16,894	19,370	65,277	16.64	19.07	64.29

The origin, route and destination of passenger travel, as well as the type of vehicles used, why they are used and the time consumed in travel are important traffic studies. To determine the travel tendencies of persons employed in several sections of the metropolitan area, mode of transportation questionnaires were distributed among certain enterprises in representative employment districts, and 101,541 usable replies received.

The questionnaires requested place of residence; place of employment; normal mode of transportation used between residence and place of employment; the total time required in traveling between residence and place of employment; if using mass transportation vehicles, the number of blocks walked between residence and such vehicle and the number of blocks walked between such vehicle and place of employment; if automobiles were

of the city, the replies were separated into 132 residence divisions for Detroit and 23 divisions outside the city limits. The summary for one division, which is typical, is given in Table I. Summarized data for the eleven employment districts A to K are given in Table II. The per cent using mass transportation vehicles varies from 50.24 in the Hamtramck district to 74.96 in the downtown business district.

The data obtained from this survey were tabulated and charted to show the travel tendencies graphically. One of the accompanying maps shows the distribution by residence divisions of 80,000 persons leaving the Loop district between 5 and 6 p.m. and the mode of transportation used. The city was divided into 132 residence divisions for the purpose of the survey, and 23 divisions outside of the city limits were designated. In each divi-



View on Jefferson Avenue showing angle-parked commercial vehicles blocking the street and part of the sidewalk as well

used, whether they were parked in the streets or in a garage or parking lot; and the reason for the mode of transportation used.

An analysis of the 101,541 replies showed that 16.64 per cent of the persons walked, 19.07 per cent rode in automobiles, and 64.29 per cent patronized mass transportation vehicles of one kind or another. The proportion of walkers was found to be a minimum in the downtown district and a maximum in the east side district. The minimum and maximum number of persons traveling in motor cars were recorded in the Highland Park and West Warren Avenue districts, respectively. As for mass transportation vehicles, the minimum was recorded in the Hamtramck district and the maximum in the downtown district.

Further analysis showed that of the 101,541 persons tallied, 5.71 per cent procured their transportation through the use of friends' automobiles; 54.95 per cent rode the cars or buses of the Detroit Street Railway; 1.26 per cent were carried by jitneys; 4.23 per cent by the Detroit Motor Bus Company; 0.50 per cent by the Detroit United Railway and 3.34 per cent by steam trains and miscellaneous transferring means.

To obtain detailed information regarding each part

tion included on the map is a circle drawn to scale to represent the number of persons going to that division. Each circle, in turn, is divided into segments to show the relative numbers using the various modes of travel.

A summary of the reasons given by 9,954 people for the mode of transportation used by them is presented herewith: Most convenient—trolley cars; only means—trolley cars; quickest—automobiles; most economical—trolley cars; quickest and most convenient—automobiles; cheapest and most convenient—trolley cars; healthful and economical—walking; quickest and cheapest—trolley cars; dependable—trolley cars; and comfortable—automobiles.

Of those traveling by automobile to four employment districts surveyed, 33 per cent consumed more than 30 minutes of travel time; of those utilizing mass transportation vehicles, 57 per cent required time in excess of 30 minutes. A reduction in travel time to the aforesaid 77 per cent who use mass transportation vehicles would be a distinct contribution to the welfare of this number of employees. A reduction can be obtained either by workers living closer to their places of employment or by providing a faster mode of transportation.

To obtain figures on traffic direction and volume, pas-

senger and vehicle tallies were made at four approximately concentric cordons from 7 a.m. to 7 p.m. on a certain day. With these data and data secured at certain other critical locations, a vehicular traffic flow map was prepared. This map is shown in an accompanying illustration. Another exhibit was prepared showing the origin, destination and route flow of passenger automobiles, the data being secured by questioning passing motorists on the day of the cordon count.

The results show that motor traffic tends to concentrate on certain well-known routes even though alternative routes are available. It was learned, however, that certain habitual motorists used routes that they had found from experience permitted them to avoid the congested main thoroughfares.

Improvement in street pavement, parking restrictions and automatic signals were advocated as means of diluting the traffic now concentrated on a few thoroughfares. One-way streets and reversible center lines were named as possible improvement measures for certain streets.

TRANSPORTATION CONTROLS COMMUNITY DEVELOPMENT

The trend of business and building development can be controlled to a great extent through the medium of transportation. If the business district is easily accessible there is no reason to anticipate a reduction of people traveling into and out of that district. The important requirement is that transportation, both quantitatively and qualitatively, keep pace with the development of the business district, or, better still, keep ahead of it. By this is meant, where mass transportation vehicles are concerned, there must be a sufficient number to avoid undue crowding of passengers, and the headways should be such as to make long waits unnecessary; the speeds should compare favorably with those procured through the use of individual transportation units; and last, there should be in evidence the elements which contribute to bodily comfort—that is, comfortable seats, adequate lighting, proper heating and ventilation.

Through the medium of questionnaires an attempt was made to ascertain the present trend of shopping habits. A summary of the replies received from 80,000 shoppers shows that the trend is toward downtown purchases of clothing and furniture and toward neighborhood purchases of other commodities. Sixty per cent of the replies indicated that neighborhood stores are patronized more now than was the case five years ago. Recent proposed office building construction in the downtown district permits the inference that the number of people requiring transportation to and from the district will increase, bringing about centralization rather than decentralization.

It is assumed that the merchants and property owners in the downtown business area are interested in the procurement of efficient transport to and from that area. It is further assumed that such interest is not confined to them but is distributed throughout the metropolitan area and even in the suburban territory. Because of a universal demand for more efficient transport, plans should

Car Heating at Low Cost

Use of resistor losses for car heating in combination with regenerative braking has proved successful in an experimental car in Joliet, Ill.

Look for the feature article on this subject

In Next Week's Issue

which is devoted to MAINTENANCE AND CONSTRUCTION.

be made to provide additional mass transportation facilities. Also, more attention should be given to speed, comfort and shorter routes.

A material increase in persons to be carried from the downtown district can be met by an increased use of mass transportation vehicles and a decreased use of private automobiles. The automobile, the bus and the trolley car have definite places in the transportation field and each

must be recognized. The automobile occupying 60 to 90 sq.ft. of street space and carrying an average of 1.8 persons is far more wasteful of space than either a street car or a bus. Where there is a reasonable amount of street space available for all types of vehicles, the traveler should be allowed to exercise his option as to the type he prefers. For work, and for economic or other reasons, it is deemed necessary to curtail the use of the automobile and every consistent effort should be made to substitute a service comparable in speed and comfort.

In the conduct of the traffic study invitations were extended by letters, through broadcasting stations, personal contact and questionnaires to interested persons and organizations in Detroit to send in suggestions on traffic control and regulation. The keen interest of the general public was evidenced by the hundreds of replies received. Suggestions in regard to alley traffic were as follows: (1) Pave or cinderize, clean and illuminate the alleys; (2) enforce the rules regarding parking; (3) make the alleys wider. Those concerning safety zones were: (1) Enforce the safety zone parking law; (2) provide caution lights; (3) allow automobiles to pass the post type safety zone; (4) prohibit passing safety zones on the left. Many requests were received for more one-way streets. There was little agreement on turns and turning. The principal suggestion, however, was to prohibit left turns off the main arteries. Many asked that all streets with car lines be made stop streets.

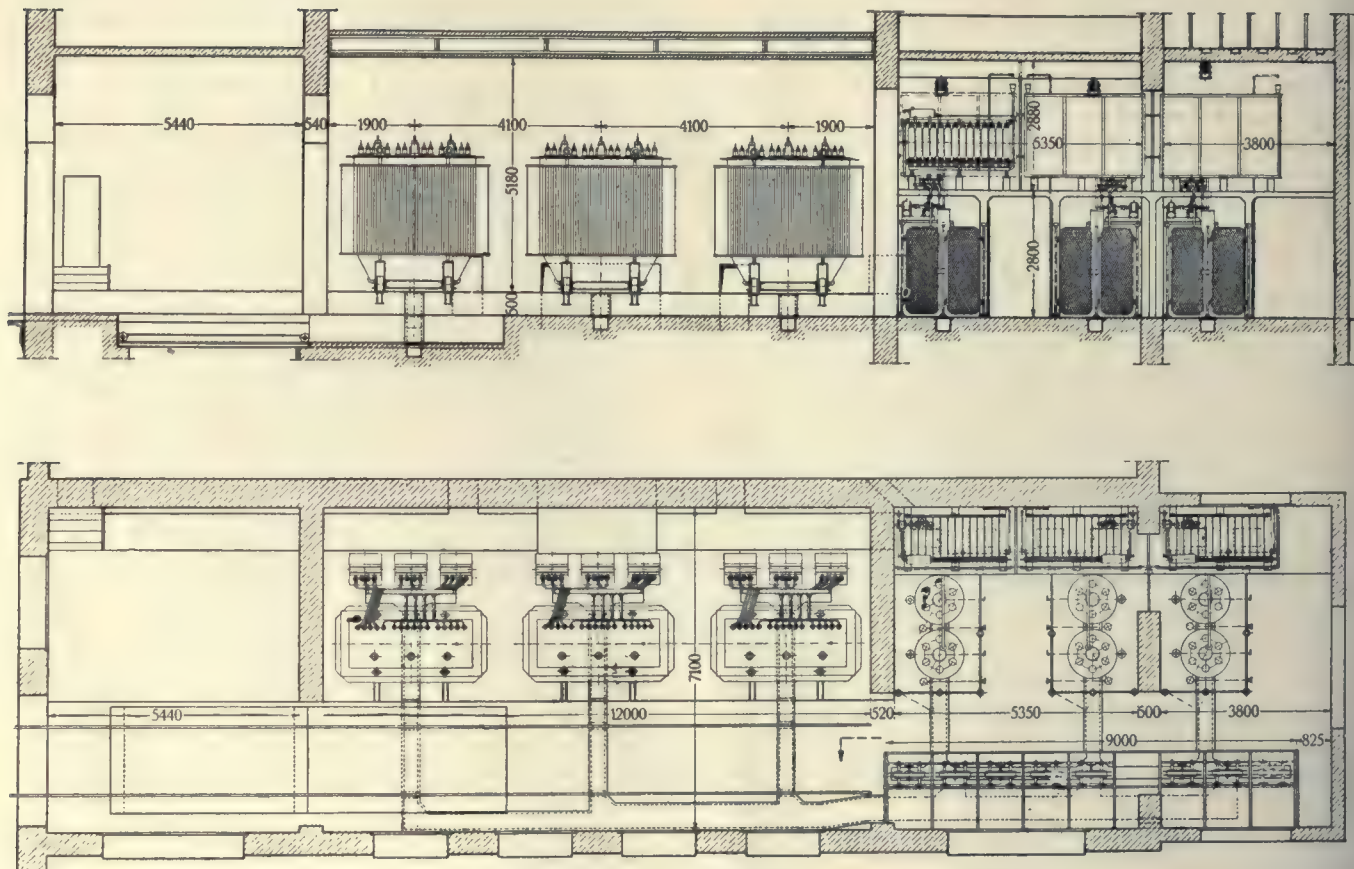
Many ideas were evoked with regard to the parking situation. The more popular suggestions were: (1) Prohibit all-night parking; (2) allow no double parking; (3) prohibit parking on stop streets; (4) permit no parking on car line streets; (5) abolish parking within the Loop district; (6) have more free parking space in the Loop district.

No Change in Chicago Parking Ordinance

IN AN abstract of an article on traffic and traffic control in various large cities by Dean J. Locke, published on page 548 of the March 31, 1928, issue of *ELECTRIC RAILWAY JOURNAL*, a statement was made "Within the past few days opponents of the plan have succeeded in securing an amendment to the ordinance permitting ten-minute parking of passenger automobiles within the Loop district of Chicago." It now appears that no modification of the ordinance effective Jan. 10, 1928, prohibiting parking in the Chicago Loop section during business hours has been made. It also appears that the few who earlier were opposed to the ordinance have now been converted and that there is no agitation to change it.

Mercury-Arc Rectifier Substations Used on European Railways

Adoption of 1,500-volt direct-current system by French government has necessitated extensive changes in power supply of Midi Railway



Plan and elevation of Montrejeau Station of the Midi Railway, furnishing 1,500-volt direct current through six 600-kw. mercury-arc rectifiers

CONSIDERABLE interest is being shown in Europe in the adoption of mercury rectifiers for substation operation on electrified main lines, and the outstanding success achieved by the first rectifier stations to be used on normal gage lines at a tension of 1,500 volts has stimulated inquiries for this equipment for similar pressures on other main lines. These first mercury-arc rectifiers for railway substations were installed at Pau, Lourdes, Tarbes and Montrejeau on the Midi Railway of France, by the British Brown-Boveri Company, Ltd.

The French government decided some time ago to standardize both the primary and trolley wire currents of all the electric railways, so that various power plants could work in parallel and the locomotives could be used on any of the electrified lines. Finally a line pressure of 1,500 volts direct current was decided on, and the Midi Railway was faced with the difficult task of transforming the already existing plants and of drawing up a new program of electrification.

The equipments of the four substations given above

are identical, and consist of three three-phase, oil-immersed transformers with natural cooling and short-circuit proof-winding supports, each built for 1,750 kva., pressure ratio 60,000/1,425 volts (twelve phase); six absorption choke coils, each 188 kva., 150 cycles, with natural cooling; three absorption choke coils, each 188 kva., 300 cycles, with natural cooling; six mercury-arc rectifiers, type GRZ 156, each built to deliver 600 kw.; three vacuum pump sets; three circulation cooling equipments; 60,000-volt a.c. switchgear; 1,500-volt d.c. switchgear and auxiliary equipment.

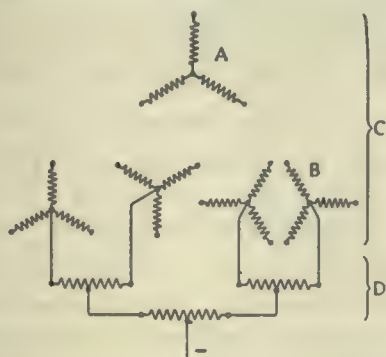
Another substation on the same system, that at Lannemezan, is similarly equipped, but contains four transformers, each of 1,750 kva.; eight absorption choke coils for 150 cycles; four absorption choke coils for 300 cycles; and eight mercury-arc rectifiers, each 600 kw.

Each transformer with three absorption choke coils and two mercury-arc rectifiers with accessories forms a set with rated output of 1,200 kw. The output of each of the four substations is therefore 3,600 kw., and that of the Lannemezan station is 4,800 kw. The aggregate

output of all the substations amounts to the total of 19,200 kw. In each station one set serves as a stand-by.

The 60,000-volt high-tension switchgear presents no new features. The twelve anodes of the rectifiers forming a set are directly connected to the twelve phases of the transformer over anode disconnecting switches. The secondary winding is subdivided into four three-phase systems displaced one from the other by 90 electrical degrees, and the four star points of these systems form the negative pole of one set, as shown in one of the diagrams. The cathodes of both rectifiers, which form the positive pole of the d.c. system, are connected to one another over two disconnecting switches. They have a common d.c. automatic circuit breaker by means of which the set can be linked up to the positive busbar.

The interlocking of the primary and of the d.c. automatic switches is shown in the special wiring diagram. The switching in push button B_1 serves to operate the



The four secondaries of the main three-phase transformer provide a twelve-phase circuit for the rectifiers

A. Primary winding. C. Transformer.
B. Secondary winding. D. Absorption choke coil.

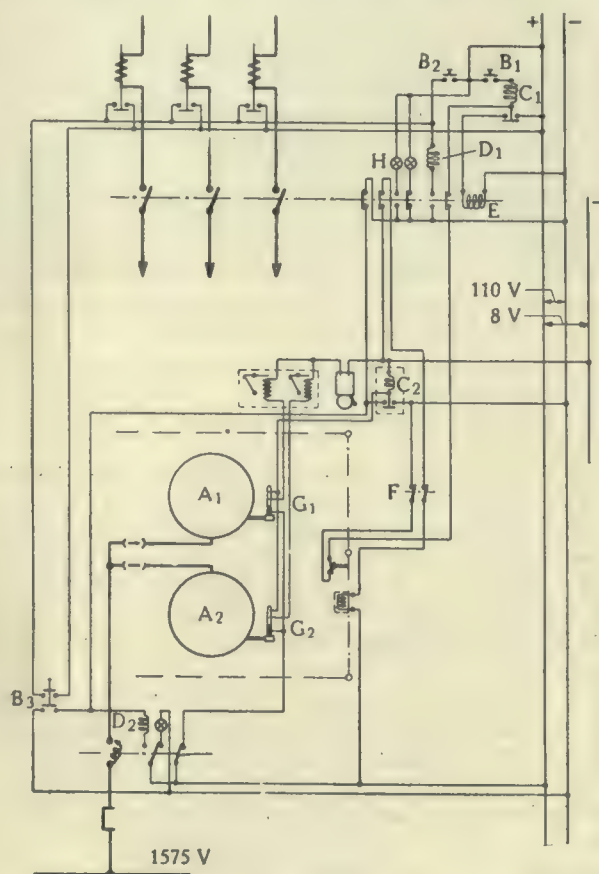
oil switch, which is provided with switching-in and tripping solenoids. This push button causes relay C_1 to act, which puts the switching in coil E under pressure. The oil switch and relay C_1 can, however, only be operated when the following conditions are fulfilled: (1) The oil switch is open; (2) the door of the protecting screen round the rectifier is closed, and (3) the hand switch F is closed.

The push button B_1 is used to trip the oil switch by connecting the tripping coil D_1 to the auxiliary busbars. The position of the switch is indicated by the two lamps H . The d.c. automatic circuit breaker is equipped with an over-current coil and a tripping coil and has to be closed by hand. The tripping coil is so connected to the oil switch on the primary side that it is only possible to close the automatic circuit breaker after the oil switch has been closed. If the primary oil switch trips, the automatic circuit breaker is immediately tripped as well. The object of this interdependence of the two switches is to prevent rectifiers A_1 and A_2 , for example, being put under pressure from the d.c. side. As, contrary to other machines and apparatus, the casing of the rectifiers is under pressure when in service, this precaution is essential for the protection of the operators.

Further protection is afforded by the screen round the rectifiers, the door of which is provided with a special lock, which can only be opened or closed when its interlocking coil is energized. In order to make it only possible to open the door when the oil switch is open, the circuit of this interlocking coil is led over an auxiliary contact on the oil switch shaft, which contact is only

closed when the switch is open. Further, in order to cut off the current through the coil during a long interruption of service, a two-pole hand switch, F , is provided, over the second pole of which the current of the switching-in relay C_1 is led, so that it is impossible to put the set into service again under these conditions.

To cut out a set, the d.c. automatic circuit breaker is first operated by hand and then the push-button switch B_2 . If, on the other hand, a set is to be cut out suddenly for some reason, it is simply necessary to operate push-button switch B_3 , which is specially marked and which



Special wiring of the rectifier for automatic operation

A₁, A₂. Mercury-arc rectifiers. C₂. Auxiliary relay.
B₁. Switching-in push button. D₁. Tripping coil of oil switch.
B₂. Tripping push button. D₂. Tripping coil of the d.c. automatic circuit breaker.
B₃. Push button for switching out rectifier set. E. Switching-in apparatus.
C₁. Auxiliary relay for actuating the switching-in coil. F. Hand switch.
G₁, G₂. Contact thermometer. H. Signal lamp.

causes both tripping coils D_1 and D_2 to act simultaneously, thus isolating the set from both sides.

In order to protect the rectifier from excessive temperatures resulting from heavy loading, high surrounding temperature or failure of the cooling water supply, special alarm devices are provided which are influenced by the contact thermometers G_1 and G_2 mounted on the anode plates. As soon as the temperature exceeds 50 deg. C. a disk relay acts and operates an alarm bell. This disk shows which of the rectifiers has caused the alarm device to act. A second contact, which closes when 60 deg. is reached, acts on relay C_2 , the closing contact of which is in parallel with push-button switch B_3 , and puts the tripping coil D_2 of the d.c. automatic circuit breaker under pressure.

The auxiliary circuit, supplied at 200 volts, 50 cycles, feeds the motor of the circulating pump and that of the air pump, as well as the heating plate belonging to the high vacuum pump. To ignite the rectifier two small motor generator sets, each of 0.6-kw. output, are installed in each station.

The rectifiers are composed of two high-grade steel cylinders, one above the other and of different diameters. The lower and wider of the two forms the arc chamber. It is welded round its lower circumference to the funnel-shaped steel baseplate, in which is located the cathode. The upper and narrower cylinder forms the cooling dome or condensing cylinder in which the mercury vapor condenses in the form of drops and flows back to the cathode. The top and bottom of this cylinder are welded to massive steel plates. The upper plate carries the bosses for the connections of the vacuum piping and ignition gear. The latter is composed of a solenoid, to the iron core of which the ignition rod is attached in the vertical axis of the cylinder. The lower plate forms a ring and constitutes a cover for the arc chamber. It carries the six main anodes and the two excitation anodes, placed round the condensing cylinder. The arc chamber is not welded to the anode plate and the joint between them constitutes the primary mercury seal of the apparatus. If necessary, therefore, the upper part of the apparatus, together with the anodes, can be raised for inspection of the rectifier.

All the electrodes are carried into the arc chamber through porcelain bushings of high heat resisting qualities and mechanical strength. The electrodes are carefully insulated from the chamber. The mercury seal serves as a packing between the electrodes and the bushings, as well as between the latter and the arc chamber. It is also used between the anode plate and the arc chamber.

The cylindrical anodes are of polished iron, carrying at their upper ends terminals for the leads supplying the rectifier. To facilitate cooling, ribbed cast-iron sleeves are drawn over the upper part of the anodes. The cathode is built as a receptacle and holds about 48 kg. (104 lb.) of chemically pure mercury. It is situated in the baseplate and the joint is sealed with mercury. Both the arc chamber and the condensing cylinder are surrounded by a sheet-metal casing which serves as a water-cooling jacket. Each pair of rectifiers is equipped with a two-stage vacuum pump to exhaust the air and obtain the high vacuum essential. Each rectifier set is equipped with a separate cooling system.

An elevation and plan of the Montrejeau station, which is typical of the others, are shown in one of the illustrations. About half the total space in the substation was available for the equipment proper, the other half being required for the 60,000-volt apparatus. The rectifier transformers with the absorption coils were lodged in the rooms which formerly held the single-phase transformers when rotary converters were used. To carry off the heat generated by the losses of the naturally cooled transformers and choke coils, apertures which existed already between the cellar and transformer room were available, and these provide sufficient cold air draft. Parallel to their length there is a gangway with a standard gage railway track on which a special truck can be run, and placed exactly opposite the transformers. To aid in lifting the active part out of the tank, when necessary, there is a special pit with hoisting gear.

The rectifiers with their accessories and the switchboard are installed close to the place originally occupied

by the auxiliary machines and apparatus. The rectifier sets are situated by themselves and are under easy supervision from the switchboard opposite. The ignition and excitation apparatus is located in the switchboard.

In order to ascertain the efficiencies of the plants installed, the power received was compared with the power delivered, with the following results:

Load.....	1/4	2/4	4/4	5/4
Input, kilowatts.....	350	692	1,325	1,676
Primary pressure, volts.....	7,775	7,725	7,650	7,600
Primary current, amperes.....	30.0	54.5	102	131
Direct current, amperes.....	195	403	790	1,010
Direct-current pressure, volts.....	1,671	1,642	1,598	1,569
Output, kilowatts.....	326	655	1,262	1,585
Power factor.....	0.805	0.905	0.962	0.965
Efficiency attained, per cent.....	93.2	94.7	95.3	95.0
Efficiency guaranteed, per cent.....	92.0	94.5	95.1	95.0

The rectifiers have proved very satisfactory in service, and during the first six months of installation each station had to withstand about 230 short circuits. The station operators are said to prefer working on rectifiers to rotary converters on account of the noiseless operation of the rectifiers.

Modern Carhouse at Detroit Completed

Constructed at a cost of \$75,000, it will effect a huge annual saving. The terminal has outside storage facilities for 250 cars



In addition to the repair shop the carhouse has ample office space, sleeping quarters and assembly rooms for the trainmen

RECOGNIZING a long-felt need for suitable terminal facilities in the northwestern section of Detroit and realizing that a saving of approximately \$500,000 annually could be effected, the Department of Street Railways determined to provide the needed facilities. Accordingly during the early part of 1927 the management purchased a 20-acre tract for the development of such a terminal. The land is located on Coolidge Highway and cost \$280,000. Construction began soon afterward and the building, costing \$75,000, was formally opened on Feb. 26 of this year. It was built according to plans and specifications drawn by the department engineers and is modern and practical. It was designed and constructed to serve efficiently as both a storage and repair terminal for the street cars of the northwestern district. Segregation of the Grand River Avenue and the Jefferson Avenue lines will be made possible by the new terminal.

The carhouse has four tracks extending the entire length of the building. Three of these have work pits accommodating four cars each so that twelve cars may



Four tracks extend the entire length of the carhouse, three of which have work pits accommodating a total of twelve cars

undergo repairs at the same time. Along the fourth track is a shower-spraying device through which the cars pass for their semi-weekly bath. Another portion of the building is devoted to offices of the division superintendent and terminal clerks, while the trainmen's lobby occupies the remaining portion of the ground floor. On the second floor are the trainmen's assembly room and dormitories which provide sleeping quarters for the men who have certain late and early runs.

The storage tracks, adjacent to the building, will accommodate 250 cars and provides for rotary movement, making it unnecessary to back or turn any cars in entering or leaving the property. The Grand River line will be the first to utilize this new terminal station, and this arrangement alone will result in a saving of approximately \$225,000 annually through the elimination of waste mileage now consumed in storing the Grand River cars at the East Jefferson Avenue carhouse.

The terminal has a spur track leading to one of the

principal railroads, so that raw materials like sand, gravel, crushed stone, steel rails, ties, etc., can be transferred conveniently. They will be stored in the yard and distributed to locations on the west side of the city as needed.

Work has been started on a modern garage on the same plot which will store 80 motor coaches. Most of these are now being kept in rented garages in the northwestern section. The new garage will be ready for occupancy in 90 days, and it is anticipated that by mid-summer 1,000 men will be working from the combined railway and bus terminal.

Realty values showed a decided upward trend with the development of the tract. The construction plans of the Department of Street Railways were laid out to allow for a frontage of 663 ft. along Coolidge Highway available for resale. It is believed that this may be sold for a sum nearly equivalent to that paid for the entire tract.



The new terminal for the northwestern section of Detroit has outside storage facilities for 250 cars



Convenient material rack for the electrical repair department

fitted with a $\frac{3}{4}$ -in. 90-deg. flange and the bottom with a 2-in. swivel roller. A tray 18 in. square and $\frac{3}{4}$ in. deep is made of 1-in. angles and $\frac{1}{8}$ -in. plate. All joints are acetylene welded. This tray is bolted to the 90-deg. flanges by $\frac{3}{8}$ -in. machine bolts. A similar tray is installed 13 in. below this and still another one 12 in. further down. It should be noted that the angle framework for the middle and lower trays is shaped around the outside of the $\frac{3}{4}$ -in. posts and fastened to the post by a $\frac{3}{8}$ -in. through machine bolt. The sheet steel bottom of these trays is welded to the angle in the same manner as was done in constructing the top tray. This rack is very well constructed and no motion exists between any of the parts. Since it contains three 18x18-in. trays ample space is provided for the storage of practically all the material and tools necessary for a complete winding job. The rollers permit of easy movement to any position convenient for the performance of the work.

Controller Main and Reverse Cylinder Racks

IF OVERHAULED controller cylinders are not taken care of properly prior to installation in the controller, there is a possibility of damage. Where this occurs it is not detected very often until after installation or when a road failure has developed and interrupted service. Where this possibility exists it is important that some precautionary measures be taken. On the New York & Harlem Railroad, New York City, care is exercised to protect repaired controller cylinders. A cylinder storage rack adjacent to the overhauling bench is used for the storage of the cylinders until they are required for service. The rack referred to is shown in the accompanying illustration. The main cylinders are stored on a rack made from 2x5-in. oak boards installed vertically at the proper centers to accommodate the cylinders and tied together top and bottom by a 1x3½-in. oak board. The front of these uprights is provided with 1x8½-in. notches cut at an angle of 25 deg. on 6-in. centers. These notches provide a safe and substantial support for the cylinder shafts. Each rack will hold seven cylinders. The same construction is followed for the reverser cylinders except that the boards are

4 in. wide, the slots 1x2½ in. and the centers 4 in. It will accommodate eleven cylinders.

These racks contain completely overhauled cylinders and every man in the shop knows that any cylinder stored here is available for service.



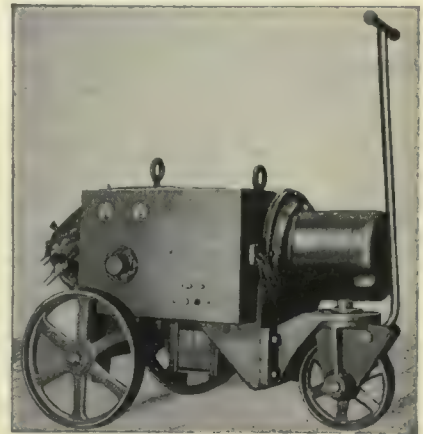
Storing cylinders in this neat and systematic manner has improved the shop appearance and lessened the possibility of mechanical injury prior to installation

They serve a further purpose in that the overhauler can see the exact number of O.K. cylinders on hand at a glance.

New Equipment Available

Single Operator Arc-Welder

PUSH-BUTTON control features a Westinghouse, 200-amp. single-operator welding set, designed to meet requirements in both shop and field. The set is started by connecting directly across the line by means of a line starter and line-start motor.



One-man 200-amp. arc welder

Starting and stopping are accomplished by a push button. A single rheostat varies the arc current over the entire welding range. Accurate adjustment from 60 amp. to 300 amp. is afforded by steps of 5 amp.

The motor-generator and control equipment are assembled in a totally inclosed frame. The exciter, which is overhung from the motor end, is fastened securely to the unit frame, guarding the operator against injury and protecting the set from dirt and falling objects.

Steady welding current, insuring thorough penetration and fusion of the weld, is obtained from a constant-current generator. A separate exciter insures a high speed of welding, and a generator voltage that responds to any changes in arc conditions. This tends to maintain a constant rate of fusion of the electrode.

The unit is rated at 200 amp., 1 hour, 50 deg. C. temperature rise on a resistance load at 25 volts. This conforms to the standard rating of the

National Electrical Manufacturers' Association. The motor is wound for 220 or 440 volts and is assembled with the necessary connections made for driving from a three-phase 60-cycle circuit. For use on a 440-volt, three-phase, 60-cycle circuit, it is only necessary to replace the operating coil on the magnetic starter and to reconnect the motor leads.

Welder Tractor Combination

COMBINATION of an electric arc welder with a Fordson tractor in an improved form is now offered by the General Electric Company, Schenectady, N. Y. The chief improvements of the outfit consist of the substitution of a new type welding equipment and the addition of head and tail lamps and a protective cover.

The principal equipment consists of a standard Fordson tractor, belt-connected to a type WD-300-A, 25-volt, 300-amp., one-hour rated 1,750-r.p.m., ball-bearing generator. This unit is mounted directly on the tractor and is protected by metal canopy and canvas side curtains. Other equipment includes governor, power take-off, muffler, waterproofed pulleys on engine and generator, belt and belt tightener, industrial disc-type rubber-tired wheels front and rear, extension frame, off-set crank, control panel and reactor, head and tail lamps, and battery and charging control. Light industrial spoke-type wheels front and rear or standard Fordson farm wheels front and rear, and any other desired accessories are optional.

The over-all length of the complete unit is 12 ft.; the height is 4 ft. 8 in.; the width is 5 ft. 2 in., and the net

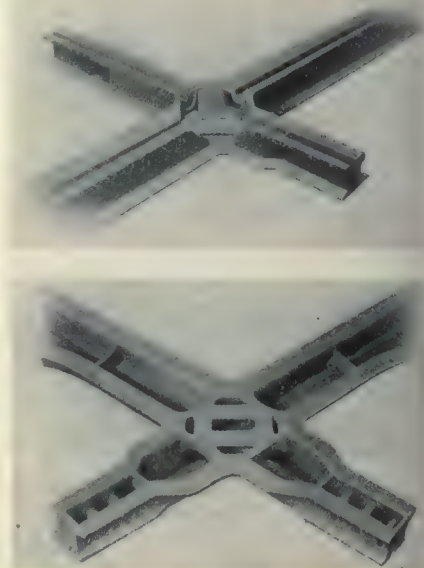
weight is approximately 4,900 lb. The utility of the tractor as a hauling device has not been impaired. For field use, the unit will haul equipment and tools to the job and then supply welding current. For welding along railroad rights-of-way, extra long welding leads are not necessary because the equipment is so easily moved at a moment's notice. The battery which supplies current for the lights and ignition is charged while the welding generator is operating. It is provided with ammeter and automatic cutout.

Manganese Crossing Designed Scientifically

DESIGNED for use in electric railways where they cross steam runs or for heavy steam railroad traffic, a scientifically constructed manganese crossing is announced by William Wharton, Jr., & Company, Inc., Easton, Pa. This has been brought out as a result of a scientific investigation and study of manganese crossing designs made during the last four years by engineers of the company. The investigation was made from two major viewpoints: first, to obtain minimum unit stresses in the structure when in service, and, second, to determine just what sections could be cast and heat-treated with the assurance that the metal would be sound throughout.

The new type of crossing incorporates a number of new features. In the first place, there is uniformity in the metal sections under the tread and groove surfaces, an advantageous feature which became evident early in the investigation. There are no supporting members joining the under side

of the tread and groove metal, thereby eliminating the danger of shrinkage, cavities and heat treatment defects in the metal surrounding the intersection of the gage lines, the point where most crossings fail. A bottom grid or floor beneath the intersection of the flangeways forms a



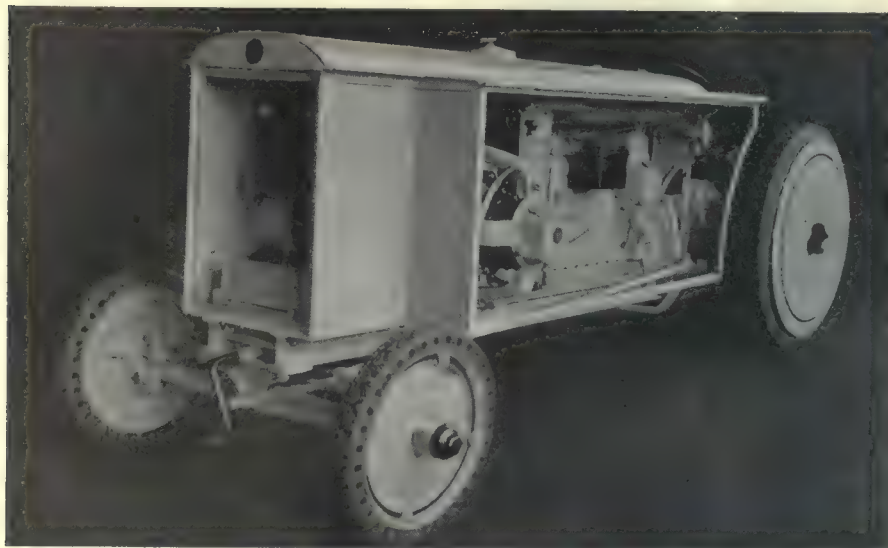
Features of the manganese crossing

hollow, box-like structure at this point, which is said to give the crossing extreme resiliency and strength, and at the same time avoids excess weight.

Cross-members in the arm sections of the crossing form a strong tie to prevent the side walls from spreading, but these members do not come in contact with the under side of the tread or groove surfaces, thereby avoiding the possibility of interior defects which so frequently cause cupping in the tread surface. The side walls of the crossing are tapered, being thicker at the top where they join the under side of the tread and guard sections.

This feature was incorporated to decrease the unit stresses in the groove and to permit a gradual transition of metal sections, from the thick tread to the thin outer flange of the base.

In arriving at the new features of this crossing, the Beggs method of analyses of stresses was followed, using a Beggs deformeter, and studying the resulting stress reactions under the microscope. The findings in these studies were checked by Prof. Mortimer F. Sayer of Union College, employing a photo-elastic model method of polarized light analysis, and the results produced were found to be remarkably close.



Fordson tractor used for welder mounting

American Association News

Rules for Engineering Committees

MEMBERS of the various committees of the Engineering Association are receiving from General Secretary J. W. Welsh copies of a pamphlet giving the regulations governing committees, the adoption of standards, and the style of specifications. This is a revision of a former publication on the same subjects. It includes sections on the purpose and scope of committee work, committee organization, instructions to committees, committee reports and standardization rules, American Engineering Standards Committee, illustrations, style of specifications, Engineering Manual and changes in rules.

The instructions to committees give clearly the procedure in conducting committee work and joint work with other organizations, a list of abbreviations and material to be included. Specific instructions are given for the preparation of reports, formulation of recommendations, and methods of preparing illustrations and specifications.

Purchases and Stores Accounting

MEMBERS of two association committees held a joint meeting in the offices of the Cincinnati Street Railway, Cincinnati, Ohio, on March 19. These were the purchases and stores committee of the Engineering Association and the stores accounting committee of the Accountants' Association. Subjects discussed were the review of the Engineering Manual, led by J. Fleming; unit piling and standard packages, led by W. E. Scott; investment in materials and supplies, led by C. A. Harris, and price records and pricing materials and supplies, led by A. A. Ordway.

Those present were J. Y. Bayliss, chairman; A. A. Ordway, vice-chair-

man; W. J. Walker, secretary; B. W. Forkner, A. L. Fischer, A. E. Hatton, C. A. Harris, H. B. Kirkland, F. E. Wilkin, W. S. Stackpole, A. S. Duncan, W. E. Scott, E. A. Murphy and John Fleming.

T. W. Casey to Represent Association at Rome

THOMAS W. CASEY, president National Pneumatic Company, has been appointed by the American Electric Railway Association its official representative at the Rome convention of the Union Internationale de Tramways, de Chemins de fer d'Intérêt Local et de Transports Publics Automobiles. Mr. Casey sailed on the *Roma* for Naples on April 13.

Mr. Casey is a member of the executive committee of the association.

A.I.E.E. Regional Meeting at New Haven

INSPECTION trips and technical papers of unusual interest make up the program of the fifth annual meeting of the Northeastern District, American Institute of Electrical Engineers, to be held at the Hotel Taft, New Haven, Conn., May 9-12.

A major part of the four technical sessions will be devoted to four unique engineering developments in the vicinity. These include a hydro-electric project, electric railway power from rectifiers, variable-ratio frequency changers and mercury turbines. A paper will be presented on the exclusive use of mercury-arc rectifiers for supply power to a trolley system and another on inductive co-ordination between the railway feeder system and local communication circuits where these rectifiers are in use. The eco-

COMING MEETINGS OF

Electric Railway and Allied Associations

April 25-27—American Society of Civil Engineers, spring meeting, Washington Hotel, Washington, D. C.

April 25-27—American Welding Society, annual meeting, 33 West 39th Street, New York, N. Y.

April 26-28—Missouri Association of Public Utilities, Jefferson City, Mo.

May 2-5—Southwestern Public Service Association, Dallas, Texas.

May 4—Metropolitan Section, A.E.R.A., 33 W. 39th Street, New York, N. Y.

May 6-12—Union Internationale de Tramways, de Chemins de fer d'Intérêt Local et de Transports Publics Automobiles, Rome, Italy.

May 8-11—United States Chamber of Commerce, Washington, D. C.

May 9—A.E.R.A. Executive Committee, Washington, D. C., 3 p.m.

May 9-10—Central Electric Railway Master Mechanics' Association, Lawrence Hotel, Erie, Pa.

May 24—New England Street Railway Club, annual meeting, Boston, Mass.

June 4-6—Midwest Electric Railway Association, Hotel Baltimore, Kansas City, Mo.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 20-27—American Railway Association, Div. 5—Mechanical, annual convention and exhibit, Atlantic City, N. J.

June 21-22—American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

July 27-28—Central Electric Railway Accountants' Association, Detroit, Mich.

Aug. 16-17—Wisconsin Utilities Association, Transportation Section, Sheboygan, Wis.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.



Members of the purchases and stores committee and the stores accounting committee in session at Cincinnati

Left to right: B. W. Forkner, A. L. Fischer, A. E. Hatton, C. A. Harris, H. B. Kirkland, W. J. Walker, J. Y. Bayliss, A. A. Ordway, F. E. Wilkin, W. S. Stackpole, A. S. Duncan, W. E. Scott, E. A. Murphy and John Fleming.

nomics of power supply for railroad electrification will be covered by another paper.

Two papers will deal with 25-cycle power obtained through two variable-ratio frequency-changer sets, one deriving power from another 25-cycle source, and the second, power from a utility system at 60 cycles.

News of the Industry

Ultra Modern Chicago

Surface Lines engineer urges three-level streets and rigid traffic code to improve safety

Public safety in the city of Chicago is being hindered by the present deplorable physical condition of its streets, E. J. McIlraith, traffic engineer for the Chicago Surface Lines, told delegates to the Midwest Safety Conference recently held in that city.

Mr. McIlraith blamed poor paving outside street car tracks and rough pavement on many streets in residential sections for the hazards and delays to traffic. In order to provide funds for necessary repairs he recommended that a new gasoline tax law be enacted to take the place of the one recently declared unconstitutional and revoked by the Illinois Supreme Court.

Safe travel in Chicago's densely congested streets, he said, would be greatly enhanced by provision of a three-deck street system in the downtown business district. Such a system should include a subway, an intermediate thoroughfare for pedestrians and at the present street level a street for motor traffic. He declared:

Chicago is in a deplorable condition for lack of transportation facilities, continuous streets, smooth paving, grade separations and convenient access to radial highways.

Sufficient through streets are lacking because everywhere they are interrupted by railway yards, embankments, rivers, canals, parks and undivided areas.

Simple planning and reasonable investment, however, will make a marvelous improvement in traffic convenience. Improvements for the future must also include grade separations and perhaps two-level highways where justified.

The outstanding fault responsible for most traffic accidents, it was said, was the laxity of law enforcement. Mr. McIlraith advocated the adoption of a traffic code that will inflict severe punishment on the careless and law-ignoring drivers who annually kill hundreds of Chicagoans and injure thousands.

He added that since the no-parking ordinance was put in effect on downtown streets last January, a survey has shown that accidents have decreased more than 30 per cent.

One-Fare Extensions Considered by Missouri Body

The Missouri Public Service Commission has under advisement several applications for an extension of the St. Louis, Mo., one fare zone to various sections of St. Louis County. Commissioner John H. Porter on March 29 concluded a hearing on the proposals at the St. Louis City Hall. The city of St. Louis and the St. Louis Public Service Company opposed the proposed fare

concessions while numerous real estate dealers and officials of some of the incorporated communities which are located in St. Louis County favored the applications.

The company and the city of St. Louis contended that the county lines are now operating at a loss and any deduction from the revenues of the Creve Couer Lake and Clayton lines as proposed would tend to react unfavorably on the rates in St. Louis. William B. Bennett, valuation engineer for

the company, testified to the average revenue per car-mile in St. Louis and declared that if transfers to the Clayton line were permitted and each car carried the maximum number of passengers the line could not pay.

At present transfers are furnished from the Olive-University to the Kirkwood-Ferguson cars going to Clayton and vice versa. The railway company favors doing away with this concession now that other parts of the county are seeking a similar privilege.

Fare Changes in Los Angeles

Local charges on Pacific Electric are reduced to 5 cents. Suburban reductions range from 20 to 25 per cent. Experimental rates to go into effect between certain cities

SWEEPING changes in the Pacific Electric Railway's fare schedule in Los Angeles and adjoining counties were announced by the California Railroad Commission on April 7. Approximately two-thirds of the one-way and round-trip fares charged by the company, affecting about that proportion of the bulk of the company's business, are to be reduced. The order is to be put into effect within twenty days and to remain in force until further ruling of the commission.

Local fares in Long Beach, Glendale, Riverside, San Bernardino, San Pedro, Santa Monica and other centers are to be reduced by the commission's order from 6 cents to 5 cents. In Los Angeles the present fare of 6 cents which the Pacific Electric has been charging is to be reduced to 5 cents, but the fare zones are to be made smaller. Reductions on suburban one-way and round-trip fare schedules will range from 20 to 25 per cent. At the same time the commutation rates are to be increased from 10 to 20 per cent on practically all lines. An experimental monthly pass, good for daily travel between Los Angeles and Pasadena and entitling the holder to local transportation on both ends of the line, is to be issued for \$9. A Sunday pass, good for unlimited travel on all lines of the road west of Upland and exclusive of the Mount Lowe division, will sell for \$1. This pass will be limited in use to the Sunday for which it is sold. The commission's order states that the commutation rate structure is simplified by the elimination of some of the forms of tickets to be sold, namely, the monthly, 30-ride and 10-ride tickets.

The order reads in part as follows:

The general basis of the experimental fare structure authorized and directed by the decision is the so-called Glendale experiment which has been in progress for nearly a year, and from which satisfactory results were obtained. In general, the Glendale experiment provided for an increase

in commutation fares and a substantial decrease in one-way and round-trip fares.

Under this Glendale experiment patronage of the line gradually increased until the financial results to the company were more satisfactory although, on the whole, the fares were lower than formerly.

The schedule, the commission announced, is an experimental one to test its theory—that keeping fares at or close to 5 cents will develop more business, and thus eventually result in increased revenues.

Experimental fares, between Los Angeles and Venice and Santa Monica, of 30 cents one-way and 50 cents round-trip have been ordered. In general round-trip fares will be double the one-way fare, less 5 cents where the one-way fare is 15 cents, and not more than 25 cents, and less 10 cents where the one-way fare is in excess of 25 cents.

Survey Bill Killed in St. Louis

The St. Louis Board of Aldermen on March 30 killed by a vote of nineteen to nine Mayor Miller's bill for the establishment of a transportation survey commission which presumably would have paved the way for a rapid transit system in the city. The bill was brought before the Aldermen for the approval of amendments offered by Mayor Miller, but the opponents took advantage of this situation to force a vote on a motion to file it. The fight on the measure centered on the Mayor's proposal that the city be refunded \$100,000 by the St. Louis Public Service Company for a similar appropriation to be made by the city to defray the costs of the survey. Opposition to this plan was led by Walter J. G. Neun, president of the Board, who relinquished his chair to Vice-President Neumann and opened the debate on the floor. He said that he was in favor of the bill, but was opposed to the provision that the railway should defray the expenses of the survey.

Fifteen-Cent Bus Fares Sought in Kansas City

The Kansas City Public Service Company has submitted to the City Council of Kansas City, Mo., a request for a 15-cent bus fare for the downtown buses. Up to this time that fare has been 10 cents. New bus routings were embraced in the suggestions filed with the city clerk, together with a detail report of losses under the bus operations of the last two years.

In this document Powell C. Groner, president of the company, pleads that the street car rider should not be asked to make up a deficit occasioned by those who prefer a more luxurious service downtown, with a seat guaranteed.

Twelve suggested bus routes are offered in place of the existing eleven. The Country Club Express line, formerly a 25-cent line, would be 15 cents, with ordinary instead of the present deluxe equipment. The infrequently used Blue Valley line would be discontinued, and the Leeds line developed into a Rosstown line to St. John Avenue. This feeder line would have a 10-cent fare. Three distinctly new lines are proposed: a Chestnut line, an Oak Street feeder line, and a 63d Street Rosstown line, all feeder lines each with a 10-cent fare. The company estimates a 10 per cent decrease in patronage on the trunk lines under the 5-cent fare.

An estimate of yearly earnings was submitted to the Council, based on halting trunk line service at 11 o'clock, and stopping service on some of the feeder lines at 8 o'clock. It is estimated that with this service there would be an annual deficit of about \$140,000 as against the 1927 deficit of \$210,204 and the 1926 deficit of \$319,790. Mr. Groner says:

The proposed plan would not make the bus system self-supporting. This is due to the large amount of feeder mileage. It is very doubtful if for years these feeders will pay operating costs. The substitution of bus service for railway service at the eastern end of the Fifth Street car line would eliminate the rebuilding of tracks at a cost of \$77,000.

Eliminating interest on the investment, the Armour-Paseo double-deckers were the only buses to earn a profit last year, the profit being \$431.

Mr. Groner concedes the new bus franchise or permit should not run for more than five years, due to the present experimental state of such services as those proposed to be rendered.

Initial North Jersey Line Plan Announced

Tentative specifications for the rapid transit line proposed to connect Newark, Paterson and Hackensack as an initial step in the development of rapid transit throughout Northern New Jersey have been announced by the North Jersey Transit Commission. They will be used in detailing costs, construction types, and rights-of-way in preparation for presenting definite recommendations for

financing and construction to the State Legislature at its 1929 session. According to the announcement the plan involves a total of approximately 22.6 miles of construction in connecting the three terminal cities. Approximately 2.3 miles will be in subway, 7 miles on elevated, and 13.3 miles on grade and fill with all grade crossings eliminated.

Give and Take Proposed in Ohio City

The railway situation in Springfield, Ohio, appears to be rapidly approaching a crisis. On April 10, W. H. Sawyer, receiver of the Springfield Railway, notified the city that service on the Madison-Ludlow Avenue line would be discontinued on April 15 and that during the week cars on that line would operate on a 20-minute schedule only between the hours of 5:30 a.m. and 9:30 a.m. and from 2:30 p.m. to 6:30 p.m. The receiver declared that curtailment was necessary as part of the program to make the railway pay, if possible.

When he took over the lines, the receiver issued a statement indicating that buses would be substituted on some routes and that probably an increase in fare would be requested. The action on the Madison Avenue division is the first concrete move to be made.

City Manager Flack has declared the situation would have to be solved by "give and take." He said:

There is no question in my mind that the railway system has too much financial overhead to bear. Even if we granted a fare increase and even if we waived payment of cost of paving between the tracks, the company would still operate at a loss. Springfield needs a transportation system, and the city must make some concessions, but we must also demand that the railway also make concessions.

The city manager pointed out that if the city refused to take any action the property would be practically valueless. In conclusion he said:

But we must have some kind of service and I believe that some basis for adjustment can be reached.

In an effort to clarify the controversy, between Springfield and the Indiana, Columbus & Eastern Traction Company over the railway paying its share of the cost of paving two streets, city officials with J. M. Pogue, general manager of the company, will interview Federal Judge Killits to determine the attitude of the court toward permitting the utility to assume a share of the paving cost.

In one case, the Springfield Railways, operating the city lines, discontinued service on a street and tore up its track when the city sought to have it share in the paving. Railway operators hold to the view that it is unfair to require the utilities to help with the burden of paying for paving to make streets better for a competitor—the automobile. Nothing came of a proposal made recently by one of the railways to help pay if the city would ban parking in the congested district downtown.

No Purchase of Interurbans by Erie Railroad

Any ideas that may have been harbored by officials of the Erie Railroad looking toward the purchase of the Buffalo & Lockport, Lockport & Olcott and Buffalo-Niagara Falls high-speed interurban lines from the International Railway, Buffalo, are reported in newspaper dispatches from Washington to have been abandoned. The reported plan to take over the electric lines was said to be part of the proposed railway mergers in the East and Middle West involving several lines. The Erie is said to fear that any purchase of interurban electric lines by it as freight and passenger feeders would merely serve to intensify competition from motor carriers.

Governor of New York Signs "Death Avenue" Bill

Included in 99 bills signed on March 28 by Governor Smith were several important New York City measures. One is expected to pave the way for the elimination of "Death Avenue" on the west side of Manhattan. The first step toward the elimination of "Death Avenue" is expected to be brought about under Assemblyman Samuel Hofstadter's bill relating to the removal of grade crossings in New York City. Under this measure the city authorities will be able to negotiate with the New York Central Railroad for the elimination of the tracks on Eleventh Avenue and for the general improvement along the west side of New York City through which the tracks of the New York Central run.

Controversial Points Being Cleaned Up in Toledo

A new power rate for the Community Traction Company, Toledo, which will settle an issue at least four years old and result in a rebate of approximately \$150,000 to the company, with the effective rate based on consumption rather than on a theoretical demand, has been agreed upon by Commissioner E. L. Graumlich and David H. Goodwillie, member of the street railway board of control, representing the city, and R. E. Burger, representing Henry L. Doherty & Company, according to the report to Mayor W. T. Jackson.

The railway will make an effort to settle the back paving claim of \$185,000 and also go along with the city administration in its paving program for this summer.

On the other hand, the city will seek to pass legislation which will enable the company to control the bus operations within the city, extend lines by means of additional buses, and take over some existing lines.

The whole plan is to be worked out under the Milner ordinance with the idea of cleaning up controversial points and eliminating competition so that the railway may be operated at a profit and

gradually work out of the deficit accumulated in the last seven years. Sinking fund charges have ceased under the terms of the ordinance.

Appraisal Expenditures Under Fire in Indiana

Alleged practice of Indiana utilities of charging to operating expenses the sums incurred by audits, appraisals and attorney fees was attacked on March 23 by the Indiana Public Service Commission with the adoption of a resolution that in the future will force such expenditures to be made from the net income and paid from the utility's own pocket.

According to Calvin McIntosh, commissioner, the resolution is the result of a hearing he conducted recently in which an increase in rates was sought. He presented figures to show that attorneys fees charged in connection with the hearing, which continued about one day, amounted to \$3,000 for one firm, \$750 for another and \$350 for a third. In addition he said that although appraisals and audits of the property and books were made by the Public Service Commission engineers and accountants, owners of the company paid \$5,000 for an appraisal to one commercial engineer and \$500 to another and that \$750 was paid by the company for a separate audit of the books, besides that made by the commission's accountant.

Rerouting Plan Discussed in Baltimore

Rerouting of cars of the United Railways & Electric Company, Baltimore, Md., was discussed at length at a recent meeting of the special commission appointed by Mayor Broening. The result was the appointment of Dean J. Locke, of the United, and William G. Albrecht, a member of the City Council and sponsor of the suggested one-way street system, as a committee to work out the details of this part of the program for submission to the commission. The commission will report the entire one-way traffic subject to Mayor Broening and the City Council in the near future.

Jacksonville Paper Has New Growth After Seven Years

Because *Trollicar Topics* has become so popular with patrons of the Jacksonville Traction Company, Jacksonville, Fla., it has been increased in size from four to six pages. More space will now be devoted to informing the car riders of the problems of the company and other railway properties. The leaflet first appeared more than seven years ago. Since that time it has been explaining the operation of the company to its readers. Hundreds of letters have been received approving *Trollicar Topics* in its new form.

Reduced Fares on Pacific Northwest

Reductions in fares on the Pacific Northwest Traction Company, Seattle, Wash., are in effect on the routes between Seattle, Wash., and Vancouver, British Columbia, through Everett, Mount Vernon, Bellingham and Blaine, Wash., and New Westminster, British Columbia. The principal changes in fares are as follows:

Miles	Old Fares		New Fares	
	One-way	Round-trip	One-way	Round-trip
31 Between Seattle and Everett.....	\$0.75	\$1.30	\$0.75*	\$1.30*
70 Between Seattle and Mount Vernon.....	2.15	3.30	1.35	2.50
98 Between Seattle and Bellingham.....	3.00	4.65	1.95	3.65
157 Between Seattle and Vancouver.....	4.50	8.00	3.00	5.50
39 Between Everett and Mount Vernon.....	1.40	2.00	.75	1.40
67 Between Everett and Bellingham.....	2.40	3.25	1.35	2.50
126 Between Everett and Vancouver.....	4.00	7.07	2.85	5.30
28 Between Bellingham and Mount Vernon.....	1.00	1.35	.55	1.00
59 Between Bellingham and Vancouver.....	2.15	3.65	1.50	2.75

* No change.

Fares reduced proportionately are in effect between other points. These fares are put in for a trial period which expires June 15, 1928.

"Skip-Stop" Service Approved By Columbus Council

Inauguration of "skip-stop" service and establishment of all railway streets as main thoroughfares have been approved by the City Council of Columbus, Ohio. Opposition to the measures was offered by Councilman Worley, who contended that the main thoroughfare clause was a scheme of the railway to seek legal immunity from accidents.

The legislation would establish "skip-stops" in all parts of the city except in the downtown district, allow cars to operate at 25 m.p.h., in the outlying districts and require all vehicles to come to a full stop before entering or crossing streets with car tracks. The present speed limit in the outlying districts is 20 m.p.h. These changes in service had been requested by C. C. Slater, president and general manager of the Columbus Railway, Power & Light Company.

Columbia Now Served by Buses

The transportation situation in Columbia, S. C., in more or less of a muddle since the cars of the Columbia Railway, Gas & Electric Company stopped running in March, 1927, bids fair to be cleared up in the near future. At the present time the city is being served by the Columbia Bus Company, a concern which has in operation nine 16-passenger Studebaker machines, with ten additional buses expected about the middle of April; also in operation are a number of unregulated 10-cent jitneys.

An ordinance has been passed by the City Council effective this month which provides that all motor vehicles operated for hire shall run on prescribed routes fixed by the City Council. A similar ordinance was passed several months ago. A jitney driver who violated it was technically placed under arrest, and

the case taken direct to the State Supreme Court to determine the constitutionality of the ordinance. Since that time, however, the General Assembly of the state has met, and it passed an act which specifically gave the Columbia Council authority to regulate motor traffic on the city streets. As a result of this act the case before the Supreme Court was dismissed before a decision was handed down. It is not believed that the jitneys' union will contest

this second ordinance, passed since the General Assembly passed its measure authorizing the Council to regulate motor transportation.

A municipal campaign late this month for the election of two members of the City Council is now in progress. At the various meetings the transportation situation has come in for much discussion.

Petitioners Ask for Referendum on Chicago Traction Legislation

Petitions signed by nearly 400,000 Chicago voters were filed at the election commissioners' office on April 6 asking that three questions of public policy regarding the city's railway problem be submitted to a referendum of the voters at the judicial election on June 4. Circulated under the auspices of the Amalgamated Improvement Association, these documents seek to make it compulsory upon Mayor Thompson and Governor Small of Illinois to submit all railway legislation for Chicago to the voters before it can become effective; they ask that voters be given an opportunity to determine whether the traction fund of \$50,000,000 shall be used to build a "loop" subway, and also whether the city should not at once provide buses for districts now without adequate transportation.

In explaining why the petitions were filed, August Knickels, president of the association, stated that Governor Small had been in office for seven years and Mayor Thompson for nine years, during which time they have both refused to give Chicago home rule.

Richmond to Journal Editor

"Transportation in Richmond Yesterday and Today" is a feature article in the March issue of *Richmond*, by G. Watson James, Jr., Assistant Editor, *ELECTRIC RAILWAY JOURNAL*. In this article Mr. James tells the story of transportation from the period of mule cars to the present-day riding on de luxe cars and buses.

Kip Stops Effective in St. Louis

Passengers on the Olive Street lines of the St. Louis Public Service Company have been saved six minutes on each trip following the installation of a kip-stop plan between Twelfth Boulevard and Channing Avenue, St. Louis, Mo. The limitation of car stops was suggested by Mr. Brooks, director of streets and sewers, to speed up the reconstruction and paving of Olive Street.

Franchise at Jacksonville Still Under Discussion

The principles involved in the proposed new citizens' committee franchise for the Jacksonville Traction Company, Jacksonville, Fla., were discussed publicly at a recent meeting of the Council. There is still disagreement on some of the major points, but the consensus of opinion is that the matter is nearer a settlement now

directorship was to give the city closer and more intelligent supervision of the company's operations and to make possible co-operation between the city and company for better service.

Mr. Knight went into considerable details concerning the simple, broad franchises granted to other utility companies in which he is interested and said that all the binding factors in a franchise may be placed on two sheets of paper. He said that all the Jacksonville company wants is "the right to live, a fair valuation of its property and a fair return on that investment." These were the only features necessary to put into a franchise, he declared.

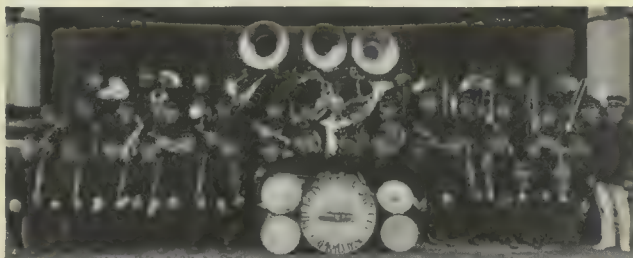
"Above the Clatter of Wheels and the Hum of Motors"

A group of railway men attained the unusual distinction of furnishing music to the entire world on Saturday night, March 31, in a joint good-will program

noon and were the guests of the Pittsburgh Railways at luncheon and for an inspection trip of the system during the afternoon. At 6 p.m. the combined groups arrived by special street cars at the Westinghouse plant at East Pittsburgh and were the guests at a banquet and entertainment in the officers' dining room on the eleventh floor of their new office building.

The broadcast program was opened by a word of welcome from Thomas Fitzgerald, vice-president of the Pittsburgh Railways, to Col. Joseph Alexander, president of the Cleveland Railway. Other members of Mr. Alexander's staff present were Ralph W. Emerson, vice-president; Fred Bullock, assistant to the president; Clinton D. Smith, director of personnel, and J. H. Cox, superintendent of welfare. Members of Mr. Fitzgerald's staff present were J. B. Donley, director of public relations, and T. W. Noonan, general manager of the Pittsburgh Motor Coach Company.

Through a special set-up the broad-



A glimpse of those who made March 31 a gala event

can at any other time since the movement for a new 30-year permit was launched two years ago.

Representatives of the citizens' franchise committee, appointed by the Council to prepare a franchise, and Peter O. Knight, Tampa, general counsel for the company, discussed the proposed bill of privileges in detail. The Council finally voted unanimously to request Mr. Knight to prepare drafts of two franchises of different types that would be acceptable to his company. These drafts will be compared with citizens' committee plan for its final modification into an operating agreement that will be acceptable to both city and company.

Giles J. Patterson, local attorney, who was chairman of the citizens' committee, and George C. Bedell, attorney, spoke for the committee. Mr. Patterson opened the discussion with a review of the committee's work. He elaborated on the proposal to establish the office of city railway director, made in the drafted franchise, saying that the plan has been successful in other cities and that the sole purpose of the

furnished by employees of the Cleveland Railway and the Pittsburgh Railways and broadcast through the courtesy of radio station KDKA of the Westinghouse Electric & Manufacturing Company.

The Cleveland group included a 150-voice male chorus and a male octette, both under the direction of Charles Dawe, while the Pittsburgh contingent consisted of a 50-piece band under the direction of Alois Hrabak. The groups alternated on the air from 10 until 11:30 p.m. The program was sent out from KDKA over three wave lengths, 27, 62 and 316 meters, the low wave being used especially so that the 80-year old mother of Mr. Dawe might listen to the program at her home in Wales. This also was the official night KDKA broadcasts to the Far North.

In order that the home folks might hear the program from their local station a special line was maintained from KDKA to WTAM at Cleveland and the latter station rebroadcast the program from 10 until 11 p.m.

The Cleveland men arrived in Pittsburgh by special train Saturday fore-

cast of this exceptionally large group was made direct from the Westinghouse officers' dining room.

Paving Charges in Ogdensburg to Be Settled

Governor Smith has signed the Thayer bill, as chapter 577 of the laws of 1928, authorizing the city of Ogdensburg, N. Y., to enter into an agreement with the Ogdensburg Street Railway compromising, adjusting and settling all differences between the city and the railway for paving charges due the city.

Over the Waves With Williams on WJAR

Five minute talks are broadcast to the people of Rhode Island every Friday evening from station WJAR, Providence, by Alonzo R. Williams, general manager of the United Electric Railways, Providence, R. I., a shrewd observer of men and events, a wit and an unusually versatile forensic orator.

Recent Bus Developments

New Installation in Quincy On April 1

The Illinois Power & Light Company instituted bus service April 1 on the North Fifth Street line in Quincy, Ill., supplanting cars which have operated on that route 61 years. Bus service was also established from Tenth and Cherry Streets to the Soldiers' Home. The North Fifth Street line was the oldest car line in Quincy, the first section being built in 1867 when the Illinois Legislature awarded an exclusive privilege for operating horse-drawn cars over the street, giving a 50-year charter. Six new Yellow coaches have been installed for operation on the substitute service, each with 21-passenger capacity.

Would Consolidate Service in Section of Pennsylvania

The applications of the Johnstown Traction Company, Johnstown, Pa., for the right to purchase the controlling stock of the Southern Cambria Railway was heard by the Public Service Com-

mission on April 5 without protest. It was brought out in the testimony that the purpose of the consolidation was to co-ordinate the railway and the bus service operated by the two companies in that section of the state.

Files Protest Before Missouri Commission

D. L. Fennell, general superintendent of transportation of the Kansas City Public Service Company, has filed a protest with the Missouri Public Service Commission against the operation of proposed bus service connecting Kansas City, Independence and Odessa, by the Chicago & Alton Railroad.

He said his company had no objection to the railroad operating a bus line to Odessa as long as it did not carry passengers to Independence or from Independence to Kansas City. The steam railroad officials assert that the proposed service between the two cities has been necessitated as a matter of self-preservation against competing bus carriers.

Terms of New Louisville Grant

Twenty-year grant awarded to Louisville Railway. Initial fare 10 cents. Provisions of grant reproduced in detail

EXCEPT for the preamble the following are the terms of the franchise for the operation of buses in Louisville, Ky., awarded recently to the Louisville Railway following its successful bid for the grant:

SECTION 2—FRANCHISE CREATED

There is hereby created and established a franchise or privilege to operate gasoline buses, or other automotive vehicles, for the carriage of passengers for hire upon and over all the streets and highways of Louisville upon the terms and conditions hereinafter set out.

SECTION 3—OPERATING RESTRICTIONS

The enjoyment of the franchise grant hereby created shall be subject to the following conditions:

1. All operations hereunder shall be conducted according to established schedules over regular routes and between fixed termini;
2. Any route within the limits of this grant may be established, modified, discontinued, or re-established with the consent of the Board of Public Works of Louisville; but not otherwise;
3. The said Board may require the discontinuance of any route established hereunder;
4. The said board shall have power to require the establishment and operation by the holder hereof of such transportation routes upon any of the streets of Louisville, and to require such additional service upon any established route or routes, or modification thereof, as may be reasonably necessary to furnish adequate and a complete transportation service, provided, however, that said board shall first make,

or cause to be made by such city agencies as it may designate, a survey of each proposed route or additional or modified service, which survey shall include a report on the patronage to be expected, the desirability of and the reasonable necessity, if any, for such new route or routes, or additional or modified service;

5. If it shall be held by any court of last resort, having jurisdiction, that any of the said powers hereunder enumerated may not lawfully be vested in and exercised by the Board of Public Works, then such of said powers shall be vested in and exercised by the legislative department of the city of Louisville, it being the intent and purpose of this ordinance that all of said powers to be exercised hereunder by the city of Louisville shall be vested in and be exercised by whatever department of the government of the city of Louisville may lawfully exercise the same.

SECTION 4—DURATION OF FRANCHISE

The said franchise or privilege shall continue for a period of twenty years from and after the approval of this Ordinance.

SECTION 5—RATE OF FARES

The holder of this franchise may charge and collect toll during the first year of operation hereunder at a rate not exceeding 10 cents for each passenger carried within the city limits, with free transfers between bus lines in the making of a single continuous trip. Transportation of school children shall be furnished at one-half fare and to policemen, firemen and park guards, when in uniform, free.

Provided, first, that if this franchise be acquired by a person or corporation operating, in Louisville, a system of electrically propelled street cars running on rails, or

by a subsidiary of such corporation, then such person or corporation shall furnish free and reduced fare transportation hereinbefore set out and in addition shall give and receive transfers for the making of a single continuous trip within the city limits upon terms as follows: From bus line to bus line, and from bus line to electric car line, free; and from electric car line to bus line for not more than the differential between electric car fare and bus fare. The bus fare for the first year of operation shall not exceed 10 cents, and shall thereafter be controlled in the same manner and upon the same principles as the electric car fare, and

Provided, secondly, that by whomsoever the franchise may be acquired, in the adjustment of bus fare, electric car fare and/or transfer rules and charges, the rate or rates for service shall be such as to yield to the holder hereof a reasonable return upon the fair value of its entire and combined properties used and useful, employed in its city transportation service.

SECTION 6—ASSIGNABILITY OF FRANCHISE

The holder of this franchise shall not sell or assign the same to any person or company engaged in competitive transportation, or about to engage in competitive transportation, in the city of Louisville, provided, that nothing herein shall prevent the said holder from mortgaging such franchise in connection with its other properties and rights.

SECTION 7—BOND

The purchaser or assignee of this franchise shall within 30 days of its acquisition, as approved by the General Council, deposit and maintain throughout the term of operation hereunder, with the Board of Public Works, a bond with corporate surety approved by said board, in the sum of \$100,000 running to the city of Louisville, conditioned as follows:

1. That the holder shall fulfill the obligations of this franchise during its entire life:

2. That in the event of any injury or damage to any person or property growing out of any negligence in the operation of the motor vehicles used by the franchise holder in the business herein, provided for, the person so injured in his person or property shall have a right of action thereon:

3. That said applicant will pay to the city of Louisville all sums due said city for any license, tax, or other liability, including all fines, and forfeitures assessed against such franchise holder by the final judgment of any court, and also to indemnify the city against any loss or damage for accidents arising out of negligence in the operation of such motor vehicles:

4. That said bond shall not be void upon first recovery, but may be sued on and recovery had until the full sum thereof is exhausted;

Provided: Should the holder of this franchise fail within 30 days from its acquisition to give bond, as in this section provided, or fail to make good any impairment in such bond within 30 days of such impairment, such failure in and of itself shall render this franchise void and of no effect, and no act or omission on the part of the city shall constitute a waiver. Approval by the Board of Public Works of bond of any holder hereof shall release all prior bonds except as to liabilities then outstanding against said prior bonds, or any of them.

SECTION 8—ADVERTISEMENT

SECTION 9—UPSET BID

In the sale of this franchise the Board of Public Works shall offer the same at an upset bid of \$5,000.

SECTION 10—PAYMENT AND DEPOSIT OF CERTIFIED CHECK

The bidder to whom such franchise or privilege shall be awarded shall pay the amount of such bid in cash to the treasurer of the said city within ten days after the same shall have been approved by the General Council, and no bid shall be received or considered by the said Board of Public Works unless such bidder shall deposit with his bid a check, payable to the treasurer of the said city, for the sum of Five Thousand (\$5,000.00) Dollars, and which shall have been duly certified by a bank established and doing regular business in the city of Louisville, and which sum of money shall be treated as part of payment by the successful bidder, in case he shall comply with his bid; and if he shall not, it shall be treated and retained as liquidated damages due to the said city. Checks deposited by unsuccessful bidders shall be at once returned to them respectively.

SECTION 11—SUPERVISING DUTIES OF BOARD OF PUBLIC WORKS

The Board of Public Works shall perform the duties herein imposed upon it of supervising the management of the operations of the holder hereof. To enable the said board to perform such supervisory duties, such technical and engineering force, auditors, accountants, inspectors and clerks may be employed as the General Council may, by ordinance, from time to time authorize; the said appointees and assistants to be named by the Mayor by and with the approval of the General Council.

SECTION 12—ACCOUNTS AND ACCOUNTING RECORDS

The Board of Public Works, or such other person or persons as may be authorized or delegated by said board or said city, shall have access to all books, records, correspondence, files, engineering studies, data and all other recorded information of any kind or character whatsoever kept by the holder of this franchise, however and in any way relating to the affairs of the said holder, past, present or future, and refusal to permit such access shall bring said company in default under the penalty clause hereinafter set out.

The accounts of the said holder shall be kept in accordance with the uniform classifications of accounts for Class A bus companies as from time to time prescribed and promulgated by the National Association of Railroads and Utilities Commissioners, unless the Board of Public Works shall from time to time agree with the said holder to modify such system of accounting.

Under the system of accounting then in force, the said holder shall render to the Board of Public Works complete monthly statements in writing.

SECTION 13—PENALTY CLAUSE

In the event the holder of this franchise knowingly fails or refuses to abide by the terms of this ordinance, or any one or more of them, or the terms of any ordinance or resolution passed pursuant to the provisions of this ordinance, it shall be subject to a fine of not less than \$50 nor more than \$100 for each offense, and each day's failure or refusal shall constitute a separate offense.

Whenever any penalty is imposed under this section, same shall be paid by the said holder out of corporate funds, and shall not be charged as an operating expense.

Nothing in the ordinance shall be deemed to barter away or to impair the police or rate-making powers of the city of Louisville, but on the other hand, the city ex-

pressly retains these powers free and unimpaired. The General Council shall exercise free and unimpaired its police powers in respect of the kind and character of service to be rendered under this franchise.

The sale of the franchise to the railway company has been approved by the Council.

The Louisville Railway has 30 buses ready to place in service under the new

bus franchise, but for the present will require only 20 of them.

James P. Barnes, president of the railway, has announced a new fast light-freight service between Louisville and Lexington. Buses of the company will carry freight from end of the electric line of the company at Shelbyville to the beginning of the electric line operating between Frankfort and Lexington.

Hearing on Interstate Bill

Various interests advocate passage of regulatory measure declared to represent joint views of state commissions and of operators

REPRESENTATIVES of bus operators and of state public utilities commissioners testified on April 10 at a hearing before the House Committee on Interstate and Foreign Commerce, in support of the bill (H. R. 12380) introduced by Representative Parker, of New York, chairman of the committee, to provide a system of federal regulation of interstate operations of motor vehicles carrying passengers as common carriers.

S. A. Markel, chairman of the legislative committee of the bus division, American Automobile Association, and John E. Benton, of Washington, general solicitor, National Association of Railroad and Utilities Commissioners, explained that the Parker bill represents a much simplified and shortened redraft of the earlier Parker bill, on which they and other organizations interested had collaborated, and that it had been presented in an effort to obtain legislation at this session.

The new bill does not apply to truck operations. Mr. Benton attributed the origin of the new bill largely to Mr. Markel's organization, although he said it had been generally approved by others, and that his association, through its officers and committees, had expressed approval, as far as the bill goes, without changing their attitude represented in the earlier bill.

Counsel for the American Railway Association and the American Short Line Railroad Association, representing the steam railroads, and of the American Electric Railway Association, also were present to give their views.

Mr. Markel said that at conferences between those he represented and the public utilities commissioners and railway interests, it was agreed that the bill is in the public interest, although bus owners were not unanimous in approving all the terms of the bill. He explained that the bill would provide for actual regulation to be administered in the first instance by joint boards of state commissioners, which appeal to the Interstate Commerce Commission.

Mr. Markel said that 44 states have regulatory laws governing intrastate operations of motor vehicles and that the bus operators have confidence in the state commissions. The language of the bill he said follows state regulatory procedure as far as possible. An attempt has been made to simplify the bill

by leaving the machinery of regulation as far as possible to the commissions. The bill is not intended to cover "contract carriers," such as sightseeing buses that make contracts with parties for special trips.

Mr. Benton said the organization of the state commissioners had been interested in legislation of this character ever since March, 1925, when the Supreme Court of the United States held that no state could restrain operations of vehicles in interstate commerce, which left about 10 per cent of the motor traffic beyond the state jurisdiction.

F. T. Singleton, chairman of the Public Service Commission of Indiana, made a brief statement, saying Indiana is especially interested in the bill because much motor traffic passes through that state.

Representative Wolverton said that an intolerable situation had been created as the result of the great increase in the volume of interstate passenger bus traffic over the bridge between Philadelphia and Camden, which now amounts to over 280 buses a day, and that the New Jersey municipalities are greatly handicapped by lack of power to regulate interstate operations. He therefore urged that action be taken at this session if at all possible.

Rehearing Granted in Staten Island Case

A rehearing will be held on April 23 by the New York State Transit Commission on the application of the Tompkins Bus Corporation for certificates of convenience and necessity for the operation of buses on eighteen routes in the Borough of Richmond (Staten Island) specified in the contract of franchise between the city of New York and the bus company dated Aug. 4, 1927. The grounds on which the commission acted in its previous refusal to approve the appeal of the company were reviewed in the *ELECTRIC RAILWAY JOURNAL* for March 10, page 416. Any action the state body may take in the matter is regarded as important since it may be considered as defining the attitude of that body as contrasted with that of the city in the matter of passing on the competency of operators seeking bus rights that might result in competition with existing carriers.

Financial and Corporate

Cortland County Traction Sought by Power Interests

Application has been made to the Public Service Commission of New York State by the Mohawk Hudson Power Corporation for consent to acquire more than 10 per cent of the capital stock of the Cortland County Traction Company, Cortland, N. Y., which operates 18 miles of electric railway, runs bus routes and does a lighting and power business. The capital stock of the Cortland Company consists of 3,200 shares, par value \$100.

The petition of the Mohawk Hudson Company states that an agreement has been reached between all the owners of capital stock of the Cortland Company and the Mohawk Hudson Company for exchange of the stock of the Cortland Company for certain stock of the Mohawk Hudson Company on the following basis:

For each share of the capital stock of the Cortland County Traction Company one share of the preferred stock of the Mohawk Hudson Company, $2\frac{1}{2}$ shares of the second preferred stock and six shares of the common stock. The shares to be exchanged are without par value. The preferred stock is entitled to cumulative dividends at the rate of \$7 a share per annum and the second preferred stock at the rate of \$7 per annum after payment of dividends on the preferred stock.

Sale of Equipment Trust Stock Approved

A compromise sale price of \$45 net on preferred stock of the Indianapolis & Cincinnati Car Trust Equipment Company is reported to have been agreed on between a stockholders' committee and representatives of the Indianapolis & Cincinnati Traction Company. The agreement will permit Charles T. DeHore and L. E. Eastman, prospective owners, to proceed to improve the road and possibly extend it.

Terms of the agreement have received the approval of Judge Robert C. Baltzell in federal court to the extent that the receivership action will be continued while the plan is being worked out. Letters are to be mailed shortly to holders of the equipment company's series A preferred stock inviting them to deposit their stock with the Fletcher Savings & Trust Company, Indianapolis, for sale to the DeHore and Eastman interests.

Before the compromise, DeHore and Eastman, it was reported, had offered stockholders \$33.50 a share, or one third of the face value of the securities. This offer has stood for some weeks, with the representatives of the inter-urban asserting they would provide the road with entirely new equipment rather than pay more for the stock.

Members of the stockholders' com-

mittee said the price of \$45 net to be paid under the agreement was more than they might hope to realize if the equipment being used on the lines was withdrawn and sold at its depreciated value. In this instance the equipment trust was somewhat unusual in that it covered rolling stock and certain power installations pledged some years ago when the road changed from single-phase to high-voltage direct current.

Net Income Increases

Trustees of the Eastern Massachusetts Street Railway report an increase of \$37,222 in net income of company. Operating expenses decreased. Company active in promotion of new business

THERE was a decrease of \$162,601 in revenue from all sources of the Eastern Massachusetts Street Railway, Boston, Mass., in 1927, compared with 1926. The net income available for dividends in that year was \$772,060, an increase over 1926 of \$37,222. This fact was disclosed in the annual report of the company's trustees for the year ended Dec. 31, 1927. Unfavorable weather conditions were almost entirely responsible for the large decrease in revenue. The railways revenue would have shown a greater decrease except for an active campaign to promote more business by the introduction of a dollar Sunday and holiday ticket in July, 1927, and the addition during the summer of 50 new de luxe light-weight cars. The cost of the 50 new cars was \$778,000. During the year 241 cars were reconditioned and 537 cars repainted.

Total passenger miles operated in 1927 were 17,912,322, as compared with 17,731,483 in 1926.

The cost of operation before taxes, interest, and rental charges was \$169,412 less in 1927 than in 1926. The reduction in expenses would have been greater except for an increase in wages of 1½ cents an hour, effective May 2, 1927, under an agreement with the union. The actual expenditures for maintaining passenger cars were \$514,845, compared with \$422,585 in 1926. The activities of the rolling stock department in 1927 were devoted mostly to improvement of passenger car equipment. The work in this department and the increased rate of wage are the real causes of the larger operating expense. There was an increase in the cost of group insurance due to the employment of a larger number of men under the enforced change from the nine-hour day to the eight-hour day.

During the year the company rebuilt 14.5 miles of track, of which 9.7 miles were in paved streets. As a result of the continued intensive supervision and improvement on rails, derailments due to defects in the track during 1927 were

only one-fourth of those in 1922, and were 22 per cent less than in 1926.

On the subject of bus operation, the report said that 1,435,817 bus-miles were operated in 1927, an increase of 148,650 over 1926. All of the bus lines operated in 1926 were continued in 1927, and in addition a bus line was started between Lowell and Lawrence by a new route south of the Merrimac River. This line replaces a local trolley line in Lowell, and also serves new territories in Tewksbury and Andover. Bus revenues for the entire system increased \$60,058, and expenses increased \$15,697. During the year the company failed, however, to earn bus operating expenses and depreciation, not including taxes and interest, by \$24,900, compared with a loss of \$62,207 in 1926. Ten motor coaches were purchased at a cost of \$89,290. At the present time the bus investment is \$538,482. The buses are operated in 26 towns and cities. To aid in snow fighting on bus lines, three caterpillar snow plows were purchased during the year at a cost of \$14,100. There are now 23 bus snow-fighting units on the system.

Dividend payments amounting to \$866,201 were made in 1927 as follows:

First preferred.....	\$248,013
Sinking fund.....	1,260
Preferred B.....	181,368
Adjustment.....	435,560
	\$866,201

Under the group insurance and pension plan, insurance policies aggregating \$40,700 in eighteen death cases, and monthly allowances to pensioners were paid during the year aggregating \$22,242. Twenty-seven other employees are receiving monthly payments under the total disability clause of the insurance plan. Six new pensioners were added in 1927 and four died. The total is now 39.

On the first preferred and sinking fund stocks, payments of 3 per cent were made on Feb. 15 and Aug. 15. On preferred B, payments of 3 per cent were made on Feb. 1 and Aug. 1. On adjust-

Buffalo Company Certifies Change in Capital

The International Railway, Buffalo, N. Y., has notified the Secretary of State of an increase in authorized capital stock to 195,000 shares from 175,000 shares. New capital will consist of 20,000 shares of \$100 par preferred stock and 175,000 shares of no par common stock. Present authorized capital consists of 175,000 shares of \$100 par capital stock. The change which has now been certified to the state has been the subject of extended comment in previous issues of the ELECTRIC RAILWAY JOURNAL.

COMBINED INCOME STATEMENT OF ALL DISTRICTS OF EASTERN MASSACHUSETTS STREET RAILWAY

	1927	1926
Street car revenue.....	\$8,472,602	\$8,699,914
Auto bus revenue.....	381,375	321,317
Express and other revenue.....	36,773	41,879
Rentals and advertising.....	190,171	198,051
From sale of power.....	262,275	272,527
Interest and other income.....	282,238	254,347
Total revenue.....	\$9,625,434	\$9,788,035
Expenses:		
Way and structures.....	\$1,221,227	\$1,229,616
Equipment.....	1,240,498	1,230,046
Power.....	1,270,720	1,281,790
Car operation.....	2,249,449	2,378,475
Injuries and damages.....	252,050	262,166
Insurance.....	73,003	73,810
Law expenses.....	15,217	40,255
Rent of tracks.....	82,382	80,167
General wages and expenses.....	241,583	235,724
Pensions.....	22,242	23,045
Group insurance.....	69,314	64,866
Stationery and printing.....	33,917	37,201
Stores and garage expenses.....	56,652	53,299
Miscellaneous expenses.....	45,307	68,210
Auto bus expenses.....	399,221	383,524
Total operating expenses.....	\$7,272,782	\$7,442,194
Total operating expenses and taxes.....	\$7,631,676	\$7,807,332
Gross income.....	1,993,758	1,980,703
Interest and rentals.....	1,221,698	1,245,865
Net income.....	\$772,060	\$734,838

Operating expenses include charges for depreciation amounting to \$848,467 in 1927 and \$917,940 in 1926. During the year 1927, \$616,463 of the depreciation reserve was applied to reconstruction and amortization.

ment stock, payments of 2½ per cent were made on April 1 and Oct. 1.

Bonded obligations of the company were retired and paid at maturity as follows: \$129,000 Bay State equipment 6's due Aug. 1, 1927; \$300,000 Eastern Massachusetts series A 6's due Jan. 1, 1928; \$105,000 Eastern Massachusetts series C 6's due Feb. 1, 1927; \$107,400 Eastern Massachusetts series C 6's due Sept. 15, 1927; and \$64,000 Peoples Street Railway 5's due Jan. 1, 1928.

The final serial payment of \$129,000 of Bay State equipment 6's was made on Aug. 1, 1927. These ten-year serial 6 per cent gold notes were issued by the Bay State Street Railway on Aug. 1, 1917, to cover in part the cost of 200 Laconia semi-convertible cars, on which a cash payment of \$323,000 was made at the time of the purchase, the total cost being \$1,631,000, and the original issue of notes \$1,308,000, of which the unpaid principal amounting to \$1,177,000 was assumed by the Eastern Massachusetts Street Railway at the time of the reorganization.

Items showing decreases in revenue were:

Street car revenue.....	\$227,312
Express and other revenue.....	5,106
Rentals and advertising.....	7,880
Sale of power.....	10,252

Items showing revenue increases were:

Auto bus revenue.....	\$60,058
Interest and other income.....	27,891

Principal increases in expenses were:

Equipment.....	\$10,452
Rent of tracks.....	2,215
General wages and expenses.....	5,859
Group insurance.....	4,448
Stores and garage expenses.....	3,353

Principal decreases in expenses were:

Way and structures.....	\$8,389
Power.....	11,070
Car operation.....	129,036
Injuries and damages.....	10,016
Law expenses.....	25,038
Stationery and printing.....	3,284
Miscellaneous.....	22,903

J. F. Collins Made Receiver of Detroit-Jackson Line

John F. Collins, vice-president and general manager of the Michigan Electric Railway Lines, Jackson, Mich., has been appointed receiver for the Detroit, Jackson & Chicago Railway, succeeding A. L. Drum. The company he will now direct operates the interurban line connecting Jackson, Ann Arbor and Detroit.

The Jackson-Detroit line certainly would appear to be more naturally a part of the Michigan Electric Railway system than the Detroit United Railway group with which it has been connected in the past. Under his new receivership, Mr. Collins contemplates operating through passenger cars from Kalamazoo to Detroit without transfer at Jackson. Other improvements in through service probably will be instituted as a result of the new arrangement.

Receiver in Charge of Puget Sound Electric Railway

The Puget Sound Electric Railway, Tacoma, Wash., is now under the direct operation of Scott Z. Henderson, local attorney, as receiver, as a result of a cancellation of the contract of Stone & Webster, Inc., Boston, effected recently under authorization of Judge Edward E. Cushman of the United States District Court. The petition for cancellation was filed in the court by the receiver. No immediate changes in the road organization will be made.

The interurban line went into receivership on Feb 21 this year, and until now its affairs have been administered by Stone & Webster, its operating managers for the last 25 years. The action in no way affects the control and operation of the Tacoma Railway & Power Company, owned by the Puget Sound electric road, this remaining in the hands of the Boston corporation.

The circumstances surrounding the affairs of the Puget Sound Electric Railway were reviewed at length in ELECTRIC RAILWAY JOURNAL for July 30, 1927, page 209.

New Member Elected

At the recent directors' meeting of the Philadelphia & Western Railway, Norristown, Pa., Archie D. Swift was elected an additional member of the executive committee.

Bondholders of New York Interurban Ready to Act

Holders of the first mortgage 5 per cent gold bonds of the Syracuse, Lake Shore & Northern Railroad, Syracuse, N. Y., due May 1, 1947, are advised that the protective committee now has a majority of the bonds of the company and is about ready to take possession of the road for the bondholders through foreclosure proceedings. Those who have not yet deposited their bonds are urged to do so at once.

In 1927 the road showed earnings of

\$44,933 before bond interest requirements, but after depreciation of \$16,266 and after taxes.

The bondholders are urged to exercise their right to take over the road since there is apparently a definite earning power in the main property. The committee says that it "desires to accomplish the best results possible for all of the bondholders and thinks that it will be to your best advantage to deposit your bonds with it and participate in a reorganization of the property rather than merely to take your proportionate share of the price which may be bid for the property upon a foreclosure sale."

\$1,372 Net Income in Detroit in February

In presenting the financial statement of the Department of Street Railways of Detroit, Mich., for February, 1928, and for the year ended Feb. 29, 1928, William M. Hauser, auditor for the department, included a statement officially presented to the administrative officers of the city of Detroit, in part to show the position of the auditor and also to make it clear that the accounts of the department have been kept in accordance with scientific practice.

The balance of net income for the month of February, 1928, is \$1,372 after the payment of sinking fund charges. This shows a decrease of \$42,017 compared with a similar month in 1927. The semi-annual interest payment on certain of the construction bonds was made on Feb. 15, 1928, in the amount of \$55,000. At the end of the month \$173,224 was paid covering the 23rd quarterly interest payment in the unpaid balance of the purchase contract with the Detroit United Railway. This brings the total amount so paid out for interest under the terms of the contract to March 1, 1928, to \$5,005,015. Not one cent of this money has been contributed by the taxpayer, it is pointed out by the auditor. It has all come out of the rate of fare.

The auditor refers to a report by Price, Waterhouse & Company, dated Nov. 29, 1927, with respect to the audit of the accounts of the Detroit Street Railways for the year ended June 30, 1927, in which it is stated "as pointed out in our previous reports it is to be regretted that a more specific statement as to what was to be contained in the expression 'fixed charges' was not set forth in the charter, especially with regard to the element of depreciation. From an accounting standpoint depreciation is generally considered as a fixed charge, so that from the standpoint the city charter requires that the rate of fare shall be sufficient to cover both the elements of debt requirement and depreciation."

The auditor of the department does not agree with the standpoint taken by Price, Waterhouse & Company in several respects and suggests that on account of the different views with respect to depreciation it would seem that the corporation counsel should be asked to give an opinion as to just what is meant

by the section in the city charter under fixed charges. The auditor states that if this opinion is given it will clear up the much-discussed difference in the reports, namely \$1,283,159, which Price, Waterhouse & Company, claim has not been provided for in the accounts of the department for the year ended June 30, 1927.

Under date of Feb. 21, 1928, or practically eight months after the close of the fiscal year ended June 30, 1927, the auditor received from Price, Waterhouse & Company, so-called audit adjustments in connection with the accounts of the department at June 30, 1927. The auditor states that he is now engaged in auditing and checking these adjustment items.

Quebec Company Reported in Deal

Shareholders of the Quebec Railway, Light, Heat & Power Company have approved the sale of the company as a going concern to the Quebec Power Company. The price obtained is sufficient to discharge all outstanding obligations of the company, including principal, interest and redemption premium of outstanding bonds, including all outstanding bonds of Quebec-Jacques Cartier Electric Company, the properties and assets of which are to be taken over by Quebec Railway, with the purchase price sufficient to enable the company on liquidation to pay to all holders of the company's outstanding common shares a sum of \$80 in cash.

Homestead Line Bought by Pittsburgh Railways

Purchase of the Homestead & Mifflin Street Railway, Homestead, Pa., has been made by the Pittsburgh Railways. The lines were taken over April 1. They include 3½ miles of track, overhead lines, and eleven street cars.

The new owner of the line has filed with the Public Service Commission a petition asking permission to charge the usual rate of fare, 10 cents, with three checks for a quarter, in addition to granting transfer privileges which patrons of the line do not have at present. The present fares will remain until the commission renders its decision.

\$126,014 Available on Petaluma Line for All Changes

The Petaluma & Santa Rosa Railroad, operating in Petaluma to Sebastopol and Santa Rosa, Cal., reports to the Railroad Commission its 1927 operating revenue at \$561,474, compared with \$579,119 for 1926. Operating expenses, excluding taxes for 1927, are \$417,212, and \$426,257 for 1926, leaving net operating revenue of \$144,261 for 1927, and \$152,861 for 1926. During 1927 taxes charged to operation amounted to \$32,746, and for 1926 to \$34,394. Deducting the taxes leaves operating income of \$111,514 for 1927, and \$118,466 for

1926. Adding to the operating income, the non-operating income of the company and deducting non-collectible revenue and rents, results in a gross corporate income (which represents the amount available for interest, amortization of debt discount, other fixed charges, non-operating expenses, dividends and surplus) of \$126,014 for 1927, and \$125,607 for 1926.

Penn-Ohio and Northern Ohio in Deal

A special meeting of Penn-Ohio Edison stockholders has been called for May 1 to ratify an exchange offer to stockholders of the Northern Ohio Power Company, according to which two-thirds of a share of Penn-Ohio Edison common stock plus an option for an additional one-third share will be

issued in exchange for each share of Northern Ohio Power common stock. The options will entitle the holder to purchase Penn-Ohio Edison common at a rate of \$50 a share until Dec. 31, 1928, at \$55 in 1929, and at \$60 thereafter until Nov. 1, 1935.

The Northern Ohio Power Company owns more than 99 per cent of the common stock of the Northern Ohio Power & Light Company, which has assets in excess of \$55,000,000 and operates electric light and power properties in Akron, Canton and Massillon, Ohio, and electric railways and bus systems in northern Ohio with trackage entrance rights into Cleveland.

The Penn-Ohio Edison Company controls a group of companies supplying the entire electric light and power, street and interurban railway business in eastern Ohio and western Pennsylvania.

\$258,158 Net in San Francisco

This figure was carried to surplus of the Market Street Railway after 1927 operation. Many improvements in effect and accidents reduced. Funded debt being reduced steadily

TOTAL operating revenue of the Market Street Railway, San Francisco, Cal., was \$9,819,570 for the year 1927, a decrease of \$72,097 compared with 1926. The decline in passenger receipts was due to unemployment, increased use of automobiles, and particularly to easier egress from the city on account of increased ferry service, especially noticeable during the week-ends. For the greater part of the year the number of unemployed approximated 30,000, as the result of reduction in building and manufacturing activities. This explanation was made in the annual report of the company.

Operating expenses, including taxes, were \$8,245,858, an increase of \$226,764 over 1926, due to an increase in wages of employees, to better maintenance of equipment and to increased

cost of efforts to obtain new business. The wage increase became effective March 1, 1926, and consequently, for purposes of comparison, the first two months of this expense for that year were correspondingly larger than the similar two months of the preceding year.

The net operating revenue was \$1,573,712, while the sum of \$258,158—after allowance of \$500,000 for depreciation reserve—was carried to surplus, making a total of \$3,426,793 for this account as of Dec. 31, 1927. The funded debt of the company in the hands of the public was reduced from \$11,695,000 to \$11,001,500, a decrease of \$693,500, which amount represents bonds acquired for the sinking fund and treasury. The sinking fund provision in the trust indenture securing the bonds requires that \$500,000 be deposited with the trustee annually at the rate of \$125,000 quarterly. These funds are used to purchase bonds and, when so acquired by the sinking fund, such bonds remain alive and continue to draw interest for the retirement of additional bonds.

The sum of \$671,390 was expended for the maintenance of ways and structures, and \$691,269 for the maintenance of equipment. A new line was opened and an additional bus line was established. As a means of increasing traffic on Sundays the Sunday Pass system was installed Oct. 30, selling at 20 cents for unlimited rides for the day.

Education of the public, through the children, to the efforts of the company to improve service in every way has been given much consideration. A special "Comfort Car" (formerly the president's car) was dedicated to school and other deserving children and put into service with a view of

OPERATING STATISTICS OF THE MARKET STREET RAILWAY FOR THE YEAR ENDED DEC. 31, 1927

Passengers carried:	
Cash fares 5 cents each.....	192,792,769
Special car passengers.....	14,750
School and other tickets, 2½ cents each.....	3,721,267
Other tickets 5 cents each.....	27,211
Total revenue passengers.....	196,555,997
Free transfer passengers.....	67,111,448
Total revenue and transfer passengers.....	263,667,445
Free passes.....	518,073
Total passengers.....	264,185,518
Percentage of transfer passengers to revenue passengers.....	34.14
Passenger revenue per revenue and transfer passenger in cents.....	3.72
Car-hours.....	2,978,282
Car-miles.....	26,666,192
Miles of single track operated.....	270.59
Miles single track leased.....	17.59
Miles of single track owned.....	253.69
Number of passenger cars owned.....	776

PERCENTAGE OF OPERATING REVENUE	
Operating expense.....	77.81
Taxes (railway only).....	6.16
Operating expense and taxes.....	83.97
Operating income.....	16.03
Non-operating income.....	.42
Gross income.....	16.45
Deductions from income.....	13.81
Net income.....	2.64

**REPORT OF MARKET STREET RAILWAY
FOR THE YEAR ENDED
DEC. 31, 1927**

Operating revenues:	
Passenger.....	\$9,740,296
Other.....	79,274
Total.....	\$9,819,570
Operating expenses and taxes:	
Operating expenses:	
Maintenance of way and structures.....	\$671,390
Maintenance of equipment.....	691,269
Power.....	1,360,576
Transportation and traffic	3,979,313
General and miscellaneous	938,310
Total.....	\$7,640,858
Taxes.....	605,000
Total.....	8,245,858
Net operating revenue before provision for depreciation.....	\$1,573,712
Other income credits:	
Interest.....	\$23,680
Other.....	17,201
Total.....	40,881
Gross income.....	\$1,614,593
Income charges:	
Interest on funded debt....	\$790,534
Discount on funded debt....	50,611
Depreciation of railroads and properties.....	500,000
Other.....	15,290
Total.....	1,356,435
Net income for the year.....	\$258,158
Surplus, Jan. 1, 1927.....	3,220,041
Profit and loss credit—cancellation of provision for 1926 federal income tax ..	74,424
Gross surplus.....	\$3,552,623
Profit and loss charges:	
Net adjustment of discount on funded debt on bonds retired.....	\$27,731
Management services applicable to prior period.....	95,833
Miscellaneous.....	2,264
Total.....	\$125,830
Surplus Dec. 31, 1927.....	\$3,426,793

acquainting them with the details of street car operation and the mechanical features involved.

Twenty-six electric comfort cars of the latest improved pattern were built at the company's shops during the year. Considerable overhauling, rebuilding, remodeling and repainting jobs were accomplished. These many improvements, with others made in rolling stock, elicited much favorable comment from the public. The work of track improvement was continued, 0.467 mile of electric track (single track measurement) having been built and 6.667 miles of electric track rebuilt.

While the number of autos registered in San Francisco increased in 1927 over the year previous from 128,240 to 135,729, there has been a reduction in the number of accidents occurring during the year. The installation of "white fronts" upon the company's cars, has been an effective means of preventing collisions.

Discontinuance of Iowa Interurban

The Iowa Railway & Light Company has been authorized to discontinue its interurban line between Lisbon and Cedar Rapids, Iowa. By Aug. 1 the line will be dismantled according to Sutherland Dows, manager. Tracks in Mount Vernon will not be torn up.

Delaware & Hudson Subsidiaries Report

Operating revenues of the United Traction Company, Albany, N. Y., from all sources, during 1927, were \$2,738,184; operating expenses \$2,303,852; and taxes \$172,500. Operating income was \$261,832 compared with \$349,515 in 1926, a decrease of \$87,683. Operating revenues decreased \$195,338, or 7 per cent, compared with the preceding year. Operating expenses decreased \$67,055, or 3 per cent, and taxes decreased \$40,600, or 19 per cent.

Among the items of decreased operating expenses were: maintenance of roadway, power plant, and substation structures, \$3,415; cost of removing snow and ice, \$27,564; cleaning and sanding tracks, \$6,956; maintaining equipment (other than depreciation and retirements), \$31,641; transportation expenses, \$64,572; and injuries and damages (including public liability insurance), \$46,382. These decreases were partly offset by increases in track and roadway labor, \$18,135; track and roadway materials, \$12,868; paving, \$39,439; maintenance of electric distribution and transmission systems (other than structures), \$1,929; depreciation of equipment, \$1,094; equipment retirements, \$21,438; power purchased, \$4,501; and general and miscellaneous expenses, excluding injuries and damages and public liability insurance, \$14,241.

Effective on July 1, 1927, the Public Service Commission authorized an increase in fare from 7 cents to 10 cents cash, with thirteen tokens for \$1 (50 cents for school children).

Operating revenues of the Hudson Valley Railway during 1927 were \$620,849; operating expenses \$791,530; and taxes \$46,500. There was an operating deficit of \$217,181 for the year, comparable with a deficit of \$64,759 in 1926. Operating revenues decreased \$152,550, or 20 per cent, below the preceding year; operating expenses increased \$4,222, or half of 1 per cent; and taxes decreased \$4,350, or 9 per cent.

Effective on Dec. 31, 1927, the Public Service Commission authorized the abandonment of branch lines between Thomson and Greenwich and between Lake George and Warrensburg. Application has been made to the Public Service Commission for permission to abandon the line between Stillwater and Fort Edward, and depot line, belt line, and South and Knight Streets line in Glens Falls.

Operating revenues of the Capitol District Transportation Company, Inc., the bus operating subsidiary of the United Traction Company in Albany and vicinity, during 1927, were \$583,708; operating expenses \$583,856; and taxes \$5,000. There was an operating deficit of \$5,148 for the year, comparable with a deficit of \$52,291 in 1926. Operating revenues increased \$280,057, or 92 per cent; operating expenses increased \$230,506, or 65 per cent; and taxes increased \$2,408, or 93 per cent.

Four additional lines were established

during the year. Effective on Aug. 8, 1927, the Public Service Commission authorized increased rates of fare to equal rates authorized for United Traction Company lines.

Rate Fixing—What Constitutes Fair Value

I. Montefiore Levy, of the New York Bar, and formerly Commissioner of Education, has an article "Rate Fixing—What Constitutes Fair Value," in the New York *Law Journal* for March 24. It is a very interesting review of the situation, considering the limitations of the space it occupies. As Mr. Levy points out, almost a generation ago the United States Supreme Court held that, while the people could fix the rates, the railroads are public utilities and, although their property is charged with a public use, the rate must be reasonable, so as not to violate the constitutional prohibition against confiscation of property without reasonable compensation. At first, there was a long line of cases trying to define what was reasonable compensation and, in order to do that, one necessarily had to decide first what the value of the property was, and then the question arose, at what value the property should be taken, its value at the time of its production or its value at the time of the controversy.

According to Mr. Levy, while the court has laid down the doctrine of fair value, it has prescribed no definite rule by which to ascertain that value. Several lines of inquiry have been suggested that may be pursued, but the court, limited by human judgment, has wrestled and is still wrestling with the problem. After citing many of the so-called key cases, among them *McCardle vs. the Indianapolis Water Company*, he says that "from the determination reached in the *McCardle* case it can be surmised that the tendency of the Supreme Court of the United States is to place emphasis on reproduction cost as a basis for determining 'fair value,' and that it is disposed toward liberality in deciding what would be a reasonable return on such fair value."

Voting Trust Agreement for Omaha

Holders of all outstanding common and preferred stock of the Omaha & Council Bluffs Street Railway, Omaha, Neb., have been asked by a committee composed of Albert Strauss and Marshall S. Morgan, New York, and Fred Hamilton and Louis S. Nash, Omaha, to deposit their stock so a voting trust may be created composed of John N. Shannahan, Sidney W. Noyes, Edwin N. Sanderson, Albert Strauss and Fred Hamilton.

The committee reports that 95 per cent of the bonds, which fell due last January, are now in its hands pursuant to an agreement to extend them three years in order to allow President Shannahan a free hand in working out his plans for rejuvenation.

Book Reviews

Car Builders' Cyclopedias

Simmons-Boardman Published Company, New York, N. Y. Twelfth edition. 1,200 pages. Price, \$5 cloth; \$7 leather.

This work is a complete summary of all details of rolling stock. Never before has the book been so completely revised nor more new material added than in this new 1928 edition, which is ready for delivery. It is the first edition of the *Car Builders' Cyclopedias*—the standard authority on steam railroad freight and passenger rolling stock—to be published since 1925. It, therefore, records the latest development in car design, maintenance practices and equipment.

The first edition of the *Car Builders' Cyclopedias* was published in 1879—49 years ago. It was an illustrated dictionary, which for the first time defined the proper terms or names of parts used in the construction of railway cars. Through the succeeding years, with the many changes and innovations in car design, the successive editions of the *Car Builders' Dictionary*, as it was first called, have faithfully recorded the new information and new developments.

The work is edited by Roy V. Wright, managing editor of the *Railway Age* and editor of the *Railway Mechanical Engineer*, assisted by R. C. Augur and compiled under the direction of the advisory committee of the American Railway Association, Division V, Mechanical.

The Behavior of Prices

By Frederick C. Mills, National Bureau of Economic Research, New York. 598 pages. Price, \$7.

Business men and economists will find this book of the greatest interest. It is notable for the emphasis which is placed on the individual commodity. It shows the relation of the price movements of individual commodities to the movements of other individual price series. It also treats price series in combination. By turning to the commodity index the reader can locate all the references in the book to the specific commodity that interests him, and by following the page references can trace the variability of its price; its trend over a period of years; the length of its own business cycle; and how it acts during general price movements.

The objectives of the present study were, first, to secure a fuller understanding of the behavior of individual commodity prices and, secondly, to increase the knowledge of the working of the price system and of the interrelations between its component elements. No attempt has been made in presenting the results of this study to support a specific thesis. The investigation has been looked upon as part of a general attack upon the problem of charting the price system, defining its elements,

tracing the connections between these elements, determining the nature of the changes which occur in the price system with the passage of time and with changes in general economic conditions, and of describing more exactly the part which the system of prices plays in economic processes. This view of the relation of the present study to the broad task of surveying the price system has conditioned the plans for the investigation and has determined the form in which the results appear.

The Road to Plenty

William Trufant Foster and Waddill Catchings. The Pollak Foundation for Economic Research. Boston, Houghton, Mifflin Company. 232 pages. Price, \$2.

In the "Road to Plenty," the authors offer their solution for the "dilemma of thrift" which they pointed out and thoroughly discussed in their three previous books, "Money," "Profits" and "Business Without a Buyer." The new book is written for the layman. The theory which Messrs. Foster and Catchings have propounded in their earlier works is that economic depressions, with their accompanying unemployment, idle factories and capital are due to the reduction in consumer purchasing power, and that this reduced purchasing power is due, in turn, to the abstraction of both corporation and individual savings from the cycle of money flow between producer and consumer. This, then, is the dilemma, that the worker—who is also consumer—is urged to save, but by his savings brings about depression. He saves to his own ultimate disadvantage.

The cure for this condition, the authors believe, lies in increasing the construction of public works and production facilities at a rate sufficient to make up for the loss due to the abstraction of savings. Thus, by putting money into the hands of workers, the purchasing power always is kept even with productive capacity.

Obviously, if productive capacity, instead of being increased by spurts, were developed only at the same rate as the increase in consuming power, the economic swings would be avoided. Their proposal is that a mechanism be set up for holding productive and consumptive capacity in balance—to keep the consumptive power always large enough to absorb the goods the factories are able to produce. Their proposal, specifically is that the federal government collect data that will disclose at any time the relationship between productive and consumptive capacities and, when the latter tends to decline, to increase public works construction. Now we know where we are only when the depression is upon us. To serve a preventive purpose the data will need to be much expanded, and this is what Messrs. Foster and Catchings recommend.

Looking at their proposed remedy, it is patent that the problem is a complex one and that the solution will not be easy. There is the difficulty, first, of getting all the data; second, of knowing what the data mean; third, of setting up the mechanism for wise and speedy increase of public works construction. But, as the authors maintain, we shall not progress towards a solution unless we try.

National Electric Safety Code

Handbook Series No. 3 of the Bureau of Standards, fourth edition. Department of Commerce, United States Government Printing Office, Washington, D. C. 526 pages. Price, \$1.

In the preparation and revision of the code the Bureau of Standards had the co-operation and assistance of many state industrial and public service commissions, municipal electrical inspectors, engineers of operating and manufacturing companies, committees of engineering societies and representatives of the electrical workers of the fire and casualty insurance interests. The revision was carried out under the rules of procedure of the American Engineering Standards Committee. The fourth edition contains but minor changes in the general substance of the rules. The regulations dealing with line construction incorporate some important changes. The rules of this part have been rearranged entirely. This new arrangement should increase the facility of reference and make more clear the intended effect of the requirements.

A new section, part 5, has been added dealing with radio installations. The code represents a growth and development which will necessarily continue. The code rules provide specifically for variations from particular requirements when circumstances warrant different practices. Sag and tension tables and curves are included in the appendices.

Utilities Commissioners Association

1927 Proceedings of the 39th Annual Convention, National Association of Railroad and Utilities Commissioners—New York, N. Y. 600 pages. Price, \$5.

Full reports on valuation, public relations, public ownership, safety of operation, motor vehicles and others on up-to-date topics before the Dallas Convention of this association are printed in full in the 1927 Proceedings of the National Association of Railroad and Utilities Commissioners. The addresses of many speakers such as William A. Prendergast, chairman New York Public Service Commission and Lucius S. Storrs, managing director of the American Electric Railway Association, are of interest to bankers, lawyers, railroad executives and public utility managers. Special features are the addresses of John J. Esch, former chairman of the Interstate Commerce Commission, entitled, "The Age of Speed" and of Frederick A. Farrar, vice-president of the Electric Bond & Share Company, called, "Financial Problems of Public Utilities."

Personal Items

J. S. Harrison Has New Title in Jacksonville

J. S. Harrison, for more than a quarter of a century claim agent of the Jacksonville Traction Company, Jacksonville, Fla., is now known as general claims attorney. The general claims attorney began working for the Jacksonville Traction Company as secretary to the manager in 1899 and was made claim agent in 1902.

Mr. Harrison was born at Olustee, Fla. He attended the Florida University, which was then known as the Florida Agricultural College. He took a special course in law at the Florida Law School under Walter B. Clarkson, of Yale.

Changes in North Dakota Commission

At the reorganization meeting of the Board of Railroad Commissioners, North Dakota, held on April 1, Fay Harding was elected president. Among his present duties Mr. Harding will continue to handle the matters relating to the licensing of buses.

Ben C. Larkin has been appointed commissioner succeeding the late Frank Milhollan. Mr. Larkin has been chief elevator accountant for the commission since July, 1925. For many years he was active in public life in North Dakota and is a former Speaker of the North Dakota House of Representatives.

New Receiver of Detroit-Jackson Road Selects Staff

Following the appointment of John F. Collins, vice-president and general manager of the Michigan Electric Railway lines, as receiver for the Detroit, Jackson & Chicago Railway, he announced the following staff:

H. D. Sanderson, Jackson, chief engineer and manager for the receiver; Otto H. Degener, Jackson, secretary-treasurer; G. W. Quackenbush, Grand Rapids, traffic manager; R. C. Taylor, Albion, superintendent of equipment; R. Southard, Ypsilanti, general superintendent; R. W. O. Taylor, Jackson, purchasing agent.

Besides directing the management of the M. E. R. lines, Mr. Collins is president of the Southern Michigan Transportation Company and the Rapid Transportation Company, operating buses between Jackson and other Michigan cities. Electric railway and bus lines totaling 723 miles in length are administered by Mr. Collins from his central office in Jackson.

In commenting on the appointment of Mr. Collins, the *Citizen-Patriot* of Jackson said:

The appointment is an earned tribute to Mr. Collins' ability as an administrator.

In the face of the most discouraging competition he has kept the M. E. R. system out of receivership, and through the organization and promotion of bus routes paralleling the electric lines has infused new hope into the interurban transportation business in Michigan. The bondholders of the D. J. & C. apparently have turned to him as a refuge in time of distress.

H. T. Connolly Heads Maryland Association

H. T. Connolly was elected president of the Maryland Utilities Association at the meeting in Baltimore on March 23. Mr. Connolly is general manager of the Washington, Baltimore & Annapolis Electric Railroad. He entered the service of that company twenty years ago, starting in as a substation operator. Later he was promoted to



H. T. Connolly

the position of foreman of substations. Three years thereafter, at the time the Washington, Baltimore & Annapolis acquired the old Annapolis Gas & Electric Light Company, later the Annapolis and Chesapeake Bay Power Company, Mr. Connolly was made superintendent of power and in 1922 he became manager of utilities. Two years later he was made superintendent of equipment and in June, 1925, was appointed general manager of the property. At that time James J. Doyle was elected president. Before Mr. Connolly's affiliation with the Baltimore organization he was in the electrical field, serving with the old Maryland Steel Company, now the Bethlehem Steel Company, at Sparrows Point, Md.

Mr. Connolly was born in Baltimore Dec. 29, 1888. He attended private schools in that city.

WILLIAM N. NEFF has been appointed general superintendent, in charge of operation and maintenance of way and structures of the entire Northwestern Pacific Railroad System. Since April 1 his headquarters have been at Sausalito, Cal.

H. V. Faber at Savannah, and B. T. Moore in Jacksonville

H. V. Faber, for two years assistant treasurer of the Jacksonville Traction Company, Jacksonville, Fla., has been transferred to the Savannah Electric & Power Company, Savannah, Ga., to act in the same capacity. At Savannah he succeeds Paul Fleming, who resigned to become associated with the Philadelphia & Reading Coal & Iron Company at Philadelphia.

Mr. Faber went to Jacksonville in July, 1926, from the treasurer's office of Stone & Webster, Inc., of Boston, to become assistant treasurer. He was at one time assistant treasurer of the Haverhill Gas & Light Company, Haverhill, Mass., and prior to that was traveling auditor for the parent organization. During the time the Hog Island shipyard was under the executive management of Stone & Webster he was cost accountant there. He was also treasurer of the Florida Public Utilities Information Bureau.

Benjamin T. Moore, formerly a traveling auditor for Stone & Webster, Inc., from the firm's office in Boston, has succeeded Mr. Faber at Jacksonville. Mr. Moore was at one time chief clerk of the Mississippi River Power Company. Later he was assistant treasurer of the Keokuk Electric Company, Keokuk, Iowa. In 1925 he was assigned to the auditing department at Boston.

P. A. MAXIMOV, president of the Soviet Electrotechnical Trust, has arrived in New York accompanied by B. I. Bukhovtsev, production manager of the trust, to make a study of the electrotechnical industry and of electric railways in the United States. The introduction of electrical power in industry, transportation and for lighting purposes is proceeding now on a scale never before known in Russia. Mr. Maximov expects to stay in this country about six weeks. Together with Mr. Bukhovtsev he will visit Schenectady, Boston, Chicago, Milwaukee and other industrial centers.

Obituary

HOMER M. PRESTON, railway operator and banker, died at his home near Jamestown, N. Y., on April 2. Mr. Preston was president of the Jamestown, Westfield & Northwestern Railway, the Jamestown Street Railway and the Jamestown Motor Bus Transportation Company. When Almet N. Broadhead, who controlled the Jamestown properties, died in 1925 Mr. Preston was elected president. While separate corporate structures have continued, the railway and bus lines have been operated under one general management. Mr. Preston had previously served as a director and vice-president of the Warren-Jamestown Street Railway and had been affiliated with the Southwestern Interurban and with the Union Traction Company.

Manufactures and the Markets

Chicago "L" May Buy 200 More Cars

Many improvements in service have been made by the Chicago Rapid Transit Company, Chicago, Ill., during the last five years. The company has added 205 new steel cars of the latest design to its equipment. It has lengthened station platforms on the Loop and on all the lines, and operated six-car and eight-car trains in the rush hours, where previously five-car and six-car trains were operated. It has built a large modern station at Quincy and Wells Streets, with convenient connection to the Loop station platform at Quincy and Wells Streets, and it has built the first unit of its new shops at Niles Center. Those are a few of the major improvements that have been made in the last few years for the better service of the public.

There are other improvements which the company would like to make. There is a pressing need for express tracks on the Garfield Park Branch between Marshfield and Laramie Avenue. The company would like to purchase 200 additional steel cars this year. The carrying out of these improvements would appear to be presaged on the success of the company's appeal for a change in rates, now pending, since as the company itself says that "the money to make such improvements must come from investors, and unless the company can show reasonable earnings on its investment, new capital cannot be obtained."

Danville and Crawfordville Railway Proposed

Construction of an electric railway between Danville, Ill., and Crawfordville, Ind., and a secondary line between Ridgefarm and Paris, Ill., giving the Illinois Traction System and the Terre Haute, Indianapolis & Eastern lines two connecting links, was discussed at a conference in Danville recently. D. W. Snyder, Jr., vice-president and general manager of the Illinois Traction, and G. K. Jeffries, Indianapolis, vice-president and general manager of the Terre Haute, Indianapolis & Eastern, met representatives of the cities interested in the plan to link the two railway systems. The Paris line discussion brought out that a belt line would be imperative around Terre Haute, where heavy freight trains are not allowed through the city, adding \$1,000,000 to the project cost and the Ridgefarm-Paris line would mean another \$800,000. Use of this route as the main line would require strengthening of the trackage between Danville and Ridgefarm and between Paris and Terre Haute, with 40 miles added to the route distance. Illinois Traction representatives favored the direct line, but added that a light freight line serving the Paris district might be

advisable since it would cost less. The Crawfordville line would involve an expense of between \$4,000,000 and \$5,000,000 since the Vermilion River would have to be crossed once and the Wabash twice.

Kansas City to Complete Rehabilitation

The Kansas City Public Service Company, Kansas City, Mo., will spend over \$2,000,000 this year to complete the \$6,600,000 rehabilitation program planned when the company was reorganized. The program of the construction department involves the laying of approximately 20 miles of tangent track and 27 new special work layouts. The work of this department will cost more than \$1,000,000. It was scheduled to start March 1 and end in October.

The maintenance department will remodel 414 passenger cars during the year. Safety air equipment will be installed on 93 100-type cars, 47 400-type cars, and 14 1,000-type cars, or 154 cars in all.

The 1928 program includes the installation of ventilators, window wipers, safety air equipment, line breakers, back-

up control on double-truck cars, air rectifiers, thermostatic heat control, economy meters, double folding doors and treadle-operated doors on rear platforms. Aside from the regular overhaul work, rearrangement of the seats, stanchions and railings will be made where greater aisle space is needed.

In addition to the foregoing expenditure, the equipment department was allowed more than \$70,000 to cover other improvements, one important item of which is \$60,000 for the installation of steel wheels. This will equip approximately 50 per cent of the cars with steel wheels. All of this money is above the normal maintenance expenditure of \$663,000 for the year, making a total expenditure in the equipment department of approximately \$1,620,000.

In the other departments, way and structures, electrical distribution, and coach garage, \$220,000 was authorized for improvements, including an expenditure of \$157,000 to cover the cost of building a new a.c. distribution bus at the Grand Avenue power station and re-arranging the a.c. cables between the power station and the substations.

Trackless Trolleys for Prague

Trackless trolleys will be installed in Prague, Czechoslovakia, on a route where former street car service has been discontinued, it is announced by the president of the board of directors

Toronto Buses Delivered

Fifteen Mack city type buses have been delivered to the Toronto Transportation Commission, Toronto, Canada. This is the first consignment of buses for use in Canada to be equipped with rear treadle operated doors, a product of the National Pneumatic Company.

As an extra precaution for the safety of passengers using the rear-exit treadle doors, each bus has been equipped with a rear-view mirror. The mirror is fastened to the outer window frame on the right side of the bus, giving the driver a full view of the rear exit door. The buses are equipped with 29-passenger bodies of wood frame construction, built by the Bender Body Corporation.



The seating arrangement of the Toronto buses allows ample standing room for the rush hours



One of the fifteen Mack treadle buses delivered to the Toronto Transportation Commission

of the Prague Electric Railway Administration. The new cars will be arranged so that they can turn aside 5 m. or almost 16½ ft. on either side of the trolley wires. If they prove successful it is expected that their use will be extended.

Space Applications for A.E.R.A. Convention Mailed to Members

This year the Cleveland Convention Committee of the American Electric Railway Association, of which Col. J. H. Alexander is chairman, has provided over 135,000 sq.ft. of desirable inside space and over 3,000 lin.ft. of track space for car displays. Diagrams of the show space layout at the 47th Annual Convention, together with applications in duplicate, were mailed from Association headquarters, via registered mail to all manufacturer company members on April 14.

The procedure followed in previous years of allowing a time of 30 days for filing space applications, will again be in force this year. Fred Dell, exhibit director, calls attention to the fact that all applications received at Association headquarters, 292 Madison Avenue, New York, up to the close of business on May 14, will be awarded space by the exhibit committee, which meets shortly thereafter to make the official assignments. Should any space remain vacant after the official assignment, it will be allotted in the order in which applications are received.

Attention is also called to the fact that in order to assist the committee in making an intelligent space assignment, all questions on the application blank should be answered in detail. This is important and if the forms are filled in carefully exhibitors will save themselves some unnecessary annoyance in the way of additional correspondence to secure such information as asked for.

The exhibit this year promises to be larger than ever before. There will be some new companies which have not exhibited before, from both the railway and automotive field, and the products of these companies will bring added interest to the exhibit, which, it is agreed, is one of the largest and finest transportation exhibitions shown in the world today.

To secure a good location all who intend exhibiting are urged to get their applications in as promptly as possible. Each application is dated, time stamped and numbered in the order received and a careful check up of the list is presented to the exhibit committee when it meets to make the official allotment.

This is the one opportunity afforded manufacturers during the year to present to the practical railway man a comprehensive and intelligent display of old and new devices that are being offered and to bend his mind toward acquiring those products which will improve his service and consequently increase his income. Every manufacturer should at all times bear in mind that the annual convention and exhibit is

Cars Delivered to Boston Elevated Railway

The ten semi-steel cars being built for the Boston Elevated Railway, Boston, Mass., by the Laconia Car Company, Laconia, N. H., have been delivered. They are of the one-man, two-man double-end type, they have a total weight of 31,462 lb. with an over-all length of 45 ft. and a seating capacity of 48. Each car is equipped with four GE-264A inside-hung motors, GEK-71 control and Westinghouse air brakes with variable load attachment. Complete specifications were published in the Oct. 8 issue of the JOURNAL.



These one-man, two-man cars will seat 48 passengers



One of the ten semi-steel cars recently delivered to the Boston Elevated Railway

the market place of the industry and that from the Association's standpoint its every activity is directed to the one end of prospering the industry so it can make necessary appropriations for the purchase of new equipment, new materials and supplies. Don't delay sending in your space application.

T. W. Casey Heads National Pneumatic Company

At a meeting of the executive committee of the National Pneumatic Company, held April 10, Harold Rowntree resigned as president of the company and was elected chairman of the board of directors. At the same meeting Thomas W. Casey, for many years vice-president of the company, was elected president to succeed Mr. Rowntree; P. R. Forman, who has been general manager, was elected vice-president and general manager, and Frank Johnson was re-elected secretary and treasurer.

Roller Bearings Being Tried in Green Bay

A Birney type street car equipped with roller bearings has been put into service by the Wisconsin Public Service Corporation in Green Bay, Wis. The new roller journal bearings are of the Melcher type now being supplied by the Railway Motors Corporation, DePere, Wis., for steam railroad cars. It is planned to keep a close record of the power used by this car and the cost of

maintenance for the journal bearings. If the power is reduced 40 per cent as claimed, the economy may warrant the replacement of all present bearings.

Toronto Tests Lacquer

Toronto Transportation Commission, Toronto, Canada, has sprayed four cars with lacquer of four different manufacturers for the purpose of testing its durability as compared with enamel which is the standard material now used.

Foreign Traders to Talk on Latin-America

Five special trains will carry the bulk of the 1,500 delegates from all parts of the United States to the Fifteenth National Foreign Trade Convention to be held at Houston, Texas, on April 25, 26 and 27, next, announces O. K. Davis, secretary of the National Foreign Trade Council, in a statement of program and travel arrangements for the annual foreign traders gathering.

The principal theme of the convention will be trade with Latin America and the presence of business delegations is already assured from more than ten Latin American countries. In 1927 the total trade of the United States with Latin America was close to \$2,000,000,000, slightly greater than that of England, France and Germany, the three principal competitors of the United States.

American Engineers to Join in World Conference

Engineering leaders from practically every part of the United States meeting at Washington, D. C., on March 22 formulated preliminary plans for the participation of engineers of the United States in the World Engineering Congress which will be held next year in Tokio. An American Committee to arrange for the part the engineers of the United States will play in the Congress was formally organized and officers elected.

The engineers went to the capital on a special train from New York and Philadelphia for the dinner and meeting. The following officers and committee chairman of the American Committee, which will arrange for the sending of a large delegation of American engineers to the Congress in Japan, were elected: Honorary chairman: Herbert Hoover; chairman, Elmer A. Sperry, New York; vice-chairman and chairman of the executive committee: John W. Lieb, New York; vice-chairman, Pacific Coast: C. E. Grunsky, San Francisco; C. E. Kettering (Middle West), Detroit; executive secretary, Maurice Holland. Executive committee members are: Gano Dunn, New York; George W. Fuller, New York; Maurice Holland, New York; Dugald C. Jackson, Cambridge, Mass.; Frank B. Jewett, New York; John W. Lieb, New York; J. H. McGraw, New York; O. C. Merrill, Washington, D. C.; Calvin W. Rice, New York; Charles F. Scott, New Haven, Conn.; Elmer A. Sperry, Brooklyn, N. Y.; W. E. Wickenden, New York. John W. Lieb leads the finance committee; D. C. Jackson the technical program committee; F. B. Jewett the transportation committee; O. C. Merrill the entertainment committee; J. H. McGraw, publicity; promotion and attendance, George W. Fuller; nominating committee, Gano Dunn.

German Firm to Construct Electric Locomotives

Krupp, the great German engineering firm, has decided to undertake the construction of electric locomotives. In conjunction with the firm of Garbe, Lahmeyer & Company, of Aachen, a new type of motor for electric traction has been developed. This is a commutatorless, compensated single-phase motor, said to combine the efficiency of the three-phase motor with the advantages of the single-phase system regarding the supply of current.

As the result of satisfactory tests with the new invention, two shunting locomotives were constructed for the I. G. Farbenindustrie, one of which is said to have given entire satisfaction at a coal mine in central Germany. The importance of this new development lies in the fact that the current can be drawn direct from the main transmission lines, thus doing away with the necessity of transformer stations which hitherto have been essen-

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

Metals—New York		April 10, 1928
Copper, electrolytic, cents per lb.	13.925	
Copper wire, cents per lb.	16.00	
Lead, cents per lb.	6.10	
Zinc, cents per lb.	6.10	
Tin, Straits, cents per lb.	51.75	
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	4.15	
Somerset mine run, f.o.b. mines, net tons.	1.875	
Pittsburgh mine run, Pittsburgh, net tons.	2.00	
Franklin, Ill., screenings, Chicago, net tons.	1.825	
Central, Ill., screenings, Chicago, net tons.	1.675	
Kansas screenings, Kansas City, net tons.	2.375	
Materials		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	15.30	
Weatherproof wire base, N. Y., cents per lb.	16.5125	
Cement, Chicago net prices, without bags.	2.05	
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.00	
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.25	
Turpentine (bbl. lots), N. Y., per gal.	\$0.635	

tial. According to Krupp's estimate this will mean a saving of approximately 30 per cent on the present cost of electrification. The patent is owned by Krupp's, which will manufacture the locomotives, and the motors will be supplied by Garbe, Lahmeyer & Company.

Hungarian Electric Locomotives for Spain

The Ganz-Danubius Company and the Ganz Electrical Works of Budapest have just signed a contract with the Ferrocarriles Vascongados of Spain for the delivery of nine electric locomotives and eleven electric rail motor cars, of which six are to be passenger and five freight cars.

TRACK AND LINE

OREGON ELECTRIC RAILWAY, Portland, Ore., has filed an application to the Interstate Commerce Commission for authority to be substituted for the Linn County Logging & Lumber Railway in the proceeding on the latter's application for a certificate for the construction of an extension of its line in Linn County, Ore. The application states that the Linn County company has assigned its rights to the Oregon Electric, a subsidiary of the Spokane, Portland & Seattle Railway.

ST. LOUIS PUBLIC SERVICE COMPANY will improve the Wellston loop facilities so that seventeen cars may be handled at one time. The improvements will cost approximately \$95,000. One of the decided improvements will be that the St. Charles cars, which come into Wellston at Easton Avenue and stop for passengers in the very heart of traffic on the St. Louis-Kansas City highway, will now proceed to the loop to await their schedule time for departure, thus clearing Easton Avenue. The city limits and Wellston division of St. Louis will continue to use the loop.

LONG ISLAND RAILROAD, New York, N. Y., has been ordered by the Transit Commission to eliminate 31 grade crossings in Queens, N. Y., in accordance with the plan arranged with the state.

TRADE NOTES

ROBERT J. DENEEN and Frederic Attwood were elected vice-presidents of the Ohio Brass Company at a meeting of the board of directors held Feb. 7, 1928. Mr. Deneen is in charge of the company's sales activities in the Chicago district, while Mr. Attwood is in New York in charge of the eastern sales district.

WATSON-STILLMAN COMPANY, New York, has appointed as manager of railroad sales, H. J. Hair, formerly sales engineer for the Whiting Corporation. He will be located at the main office of the Watson-Stillman Company, 75 West Street, New York City.

GOLD CAR HEATING & LIGHTING COMPANY, Brooklyn, N. Y., has appointed as sales engineer with headquarters at Brooklyn, H. W. Dillon, formerly sales engineer of Chicago Pneumatic Tool Company. J. P. Rapp, formerly with Standard Steel Car Company, has also joined the eastern sales department with headquarters in Brooklyn, N. Y.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY has appointed Justin G. Smeby welding engineer at the South Philadelphia works. He is a member of the American Society of Naval Architects and Engineers and an officer in the U. S. Naval Reserve Force.

CANADIAN OHMER, LTD., Montreal, Canada, has been granted a Dominion charter for the purpose of acquiring the business of Canadian Taximeters, Ltd., and of marketing in Canada all products manufactured by Ohmer Fare Register Company of Dayton, Ohio. W. P. Kearney, Montreal, has been chosen president; H. B. Ohmer, Dayton, Ohio, vice-president and treasurer; M. W. Drayton, Montreal, second vice-president and secretary; R. H. Ohmer, assistant treasurer. These officers, together with R. L. Hubler, constitute the board of directors. A. J. Hopkins has been appointed general manager.

ADVERTISING LITERATURE

VANADIUM CORPORATION OF AMERICA, New York, N. Y., has issued a booklet "Automotive Springs," giving a description of the manufacture and requirements of springs.

INTERNATIONAL STEEL TIE COMPANY, Cleveland, Ohio, has published a bulletin descriptive of track paving on a production basis.

OHMER FARE REGISTER COMPANY, Dayton, Ohio, has printed form number 850 giving information on the use of Ohmer fare registers.

CONSOLIDATED CAR HEATING COMPANY, INC., Albany, N. Y., has issued a folder entitled "At the Port of Albany," descriptive of the various products that it manufactures.

Safe—



Car on a grade—power goes off—air gone—are passengers and crew safe?

If equipped with “Peacock” Staffless Brakes the stop will be sure—positive—*graduated*—as will also be the *release*. There is no doubt about “Peacock” action—no failure—the control of the car is perfect at all times. Your passengers and crew are *safe* in any emergency.

Specify “Peacock” Staffless Brakes on your new or rebuilt cars.

The
“Peacock”
Staffless



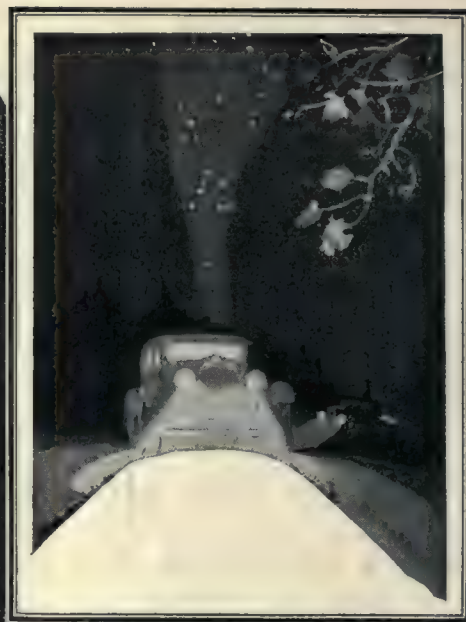
National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative

Lyman Tube & Supply Company, Limited, Montreal, Canada

The LONG and SHORT of modern head Lighting



A long range beam for the open road—tilted for city driving and passing. That is the *long and short* of modern headlighting. If your motor vehicles are Tilt Ray equipped, you can be sure that you have the most efficient lighting system obtainable—and, by far, the most economical. The Guide Motor Lamp Manufacturing Company, Cleveland, Ohio.

Guide
**TILT RAY
HEAD LAMPS**



The Driver's Loyalty *isn't all in the pay check*

How do your drivers deal with the public? How do they act? How do they drive?

Good drivers and good-will go together.

And so do good drivers and good tires.

"A run of bad luck" with tires—forced stops—roadside tire changes—upset the best of men.

Goodrich keeps the "bad luck" out of Silvertowns. To give them remarkable

uniformity, they are water cured—a Goodrich process which cures from inside and outside both, reaching every part of the tire. They are built of cords matched for stretch—and pressure filled with rubber. They have extra gum between outer plies, for extra strength and extra resistance to heavy duty.

Performance records of some of the leading bus lines show what these processes mean to Goodrich Silvertowns. They keep mileage costs down—and drivers happy.

THE B. F. GOODRICH RUBBER COMPANY, Est. 1870
Akron, Ohio. Pacific-Goodrich Rubber Company, Los Angeles, Calif.
In Canada: Canadian Goodrich Company, Kitchener, Ont.

Goodrich

HEAVY DUTY

Silvertowns

HIGH PRESSURE OR BALLOON

Lang Bod

*"After all—
it's the Setting
that counts!"*



Only by the magic of complete relaxation may the golfer realize a perfect drive. Lang craftsmanship has built into a bus body the happy faculty for delivering its passengers soothed and rested — there's good will!

LB

The Sterling Mark on Bus Bodies

ies . . .

Increase Revenue

THE fascinating beauty, the luxurious restful comfort of Lang Bodies increases revenue.

Patrons who try, repeat—repeaters become regulars—all because Lang Bodies on your buses give them that most desirable thing in travel—comfort—safety.

And—Lang Bodies have the strength to make this comfort permanent.

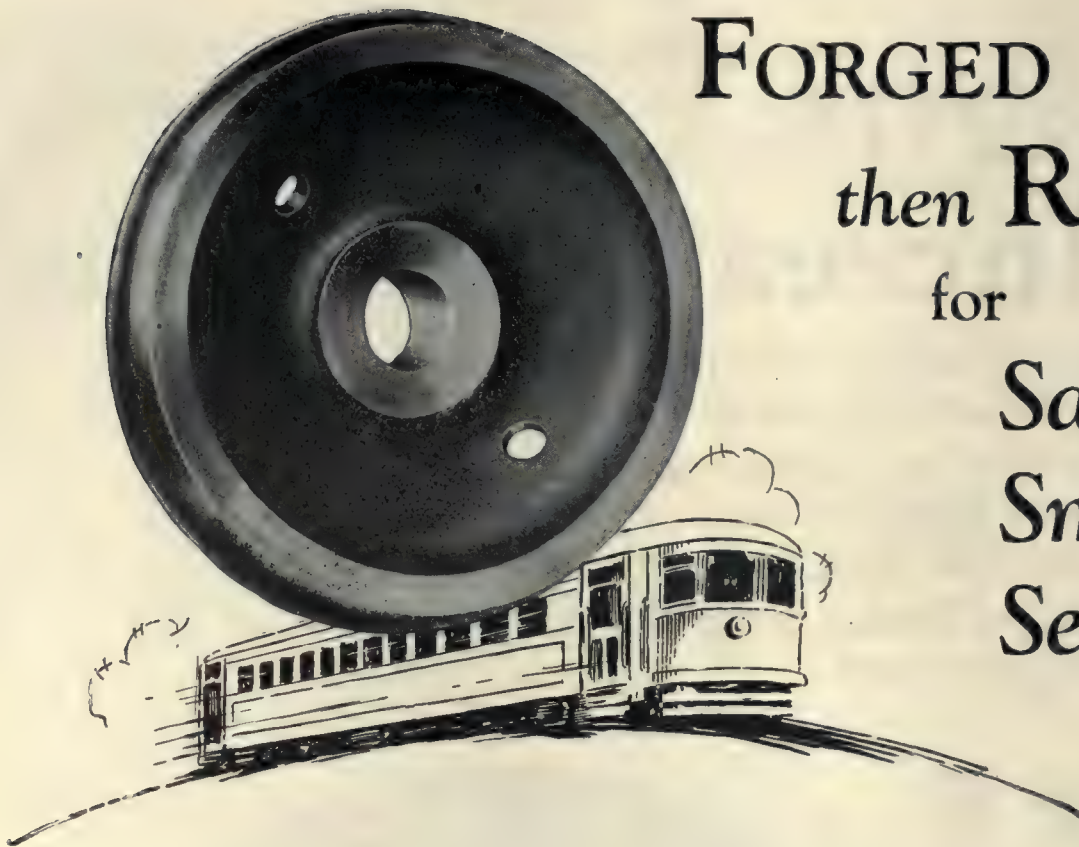
The
LANG BODY
COMPANY

Cleveland,
Ohio



LANG BODY COMPANY has also developed All Metal Bodies which combine for the first time . . . strength with light weight . . . beauty with comfort.

LB



FORGED then ROLLED for Safe, Smooth Service

BETHLEHEM Rolled Steel Wheels for electric railway service are safe, smooth-running and economical.

A combined forging and rolling process imparts toughness and gives the metal a grained, dense structure, insuring against breakage and crystallization. Flats are practically unknown.

Maximum service with minimum cost of maintenance is realized with every investment in Bethlehem Rolled Steel Wheels for Electric railway service.

Bethlehem forged steel axles possess the same high quality found in other Bethlehem forged products. They can be furnished heat treated, annealed, untreated or rough-turned all over.

BETHLEHEM STEEL COMPANY—General Offices: Bethlehem, Pa.

DISTRICT OFFICES

New York	Boston	Philadelphia	Baltimore	Washington	Atlanta	Pittsburgh
Buffalo	Cleveland	Detroit	Cincinnati	Chicago	St. Louis	San Francisco
		Los Angeles	Seattle	Portland		

*Bethlehem Steel Export Corporation, 25 Broadway, New York City.
Sole Exporter of our Commercial Products*

BETHLEHEM

102 YEARS OF MANUFACTURING EXPERIENCE

Rattan car seat webbing may be ordered through any H-W sales office



No. 327-M

FOR INTERURBAN NEEDS

THIS Heywood-Wakefield seat is designed for the modern type of interurban service where comfort is now so important. It has been selected for both new cars and for replacement use.

It has deep, double spring cushions shaped to allow more leg freedom. Mechanism rails are set in. The individual backs are properly pitched for comfort.

Our car seating experts will be glad to help you decide on the best seating equipment for your needs. This service is free through any H-W sales office.

If you have not received a copy of our new Bus Seat Catalogue, write for it.



Heywood-Wakefield
REG. U.S. PAT. OFF.



Heywood-Wakefield Company, Wakefield, Mass.; 516 West 34th St., New York, N. Y.; 439 Railway Exchange Bldg., Chicago, Ill. H. G. Cook, Hobart Bldg., San Francisco, Cal. The G. F. Cotter Supply Company, Houston, Texas. John R. Hayward, Liberty Trust Building, Roanoke, Va. The Railway & Power Engineering Corp., 133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada.



OHMERIZE

For
PROTECTION,
ECONOMY,
EFFICIENCY



566 OHMER FARE REGISTERS

added to the equipment of

INTERNATIONAL RAILWAY COMPANY, in Buffalo, New York

THE story of the International Railway Company of Buffalo is typical. It is one of America's leading transportation systems, composed of an extensive network of interurban and city lines. For years the interurban divisions of this company have been equipped with the largest type of Ohmer Fare Registers. Recently five hundred and sixty-six No. 22 Type Ohmer Fare Registers, which indicate and record three classes of fares, were installed in the cars of the Buffalo City divisions. So we are able to announce that the entire Buffalo City system, together with all the interurban lines feeding it, is 100% Ohmerized.

REVENUE—The Consideration of First Importance!

The whole business of maintaining passenger service depends on the one great essential—REVENUE. The

Ohmer System protects the revenue from loss. It enforces the payment of the correct fare and its proper registration. It safeguards the income at its source and all along the line until it is safely banked.

For three decades we have specialized in the manufacture and in the proper

application of recording instruments for transportation service.

By specializing in this one field of activity, we have developed what is recognized throughout the world to be a unique service. Ohmer Factory Branches or Ohmer Sales and Service Stations are to be found in all principal cities supplemented by a corps of fare collection experts who are ready to help you.

Write us fully about your problems in connection with the handling of fares. Our experience is at your disposal without obligation.

The OHMER Line

Fare Registers of many types, with various combinations of indicating, recording, ticket-printing, and totalizing features.

The famous OHMER Ticket-Printing Taximeter—the Atco Taximeter, greatest of all non-printing taximeters—the Atcograf Taximeter, and other models.

Mileage Meters, including the OHMER Odometer, OHMER Hub-Odometer, OHMER Recordograf, and OHMER Truck Auditor.

Astonishing New Ticket Machines which produce up to 2,500 different classes of railroad tickets and keep specific records.

Four styles of Fare Boxes.

Industrial Counters for many purposes.

OHMER FARE REGISTER CO.
DAYTON, OHIO, U. S. A.

OHMER
REG. U. S. PAT. OFF.
FARE REGISTERS



Precision fit

It exactly fits
more traffic requirements
than any other kind of coach.

- - - fits peaks and fits needs of large

THE DOLLARS INVESTED

Satisfied owners, after years of experience with Graham Brothers Motor Coaches, have admitted that they would have purchased them more readily if the prices had been higher. It took experience to convince them that they could get a 21-passenger street car coach of such high quality, complete for so little money. Only great volume production makes so low a price possible.

COMPLETE, \$4060, f.o.b. DETROIT



GRAHAM MOTOR

SOLD BY DODGE BROTHERS

off-peaks of traffic, and small systems

*“Everything a motor coach should
be or have,” is appraisal by
operators of Graham Brothers
21-passenger street car coach*

Its 6-cylinder motor gives it power and speed with unusual economy.

Its 4-speed transmission gives it the most flexible use of that power and speed—rapid acceleration and an ease and smoothness of operation long thought unattainable.

Its 4-wheel brakes (Lockheed hydraulic) give it safety and rapidity of deceleration. This combination of speed and power with rapid acceleration and deceleration make for the economies of faster schedule speed.

Its 3-stage progressive type springs, its general design and the construction of its seats provide comfort that wins and holds patrons.

Owners and operators, in constantly increasing numbers, give it preference in buying. They buy—and buy again.

BROTHERS COACHES

DEALERS EVERYWHERE

Deluxe Express



OPERATORS are finding it increasingly profitable to furnish city patrons speed, comfort and safety comparable with that which interurban passengers have been enjoying. Deluxe express service in cities, often paralleling other forms of transportation, finds patrons willing to pay a higher fare. The field of service for Graham Brothers Parlor Coaches constantly expands. Their fine appearance attracts patronage. Their speed, safety, dependability and comfort hold patronage. Their low operating costs insure profits.

The complete 16-passenger Parlor Car is \$4290 and the complete 12-passenger Club Car is \$4045, both f.o.b. Detroit

GRAHAM BROTHERS

EVANSVILLE — DETROIT — STOCKTON

A DIVISION OF DODGE BROTHERS, INC.
GRAHAM BROTHERS (CANADA) LIMITED, TORONTO, ONTARIO

CAR UPHOLSTERY THAT INVITES AND HOLDS PATRONAGE

CHASE VELMO

"A PRIL SHOWERS bring May flowers" . . . and so, too, each year you'll find a "shower" of new fabric-experiments, intended as substitutes for the time-tested Mohair upholstery, Chase VELMO—the triumph in textile craftsmanship.

To vary your choice and select a material other than a *genuine Mohair Plush* of proven merit may prove too costly an experiment. Let it rain substitutes. Chase VELMO, recognized as the leader of the Mohair Plush field, will still give you protection against the troubles of an unsatisfactory upholstery.

Made by SANFORD MILLS, SANFORD, MAINE
Selling Agents, L. C. CHASE & COMPANY, Boston
New York, Atlantic City, San Francisco, Detroit, Chicago



RAILS



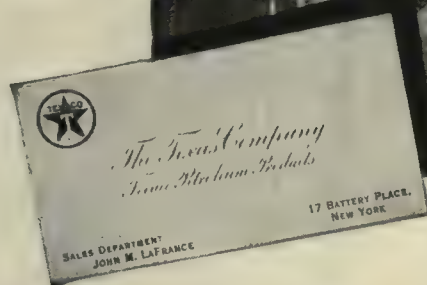
1 ton or 1000

On quick notice, you can have shipped from Foster's nearest plant, 1 RAIL or 1,000 tons of RAIL with necessary ACCESSORIES—Angle Bars, Tie Plates, Frogs, Switches, Braces, Bolts, Nuts, Spikes, etc.—materials for any type and extent of track development . . . inside trackage, sidings, extensions, main line, and for track repairs. Your order will be on its way in 1 to 24 hours after Foster receives it. Every shipment subject to your inspection and approval at destination. Every piece of Foster Rail Equipment absolutely guaranteed.

L.B.FOSTER COMPANY
PITTSBURGH • CHICAGO • NEW-YORK

Part of The Texas Company Refinery at Port Arthur, Texas. This is one of the largest refineries in the world.

Other Texas Company refineries are located at Port Neches, Tex., West Dallas, Tex., West Tulsa, Okla., Shreveport, La., Lockport, Ill., Casper, Wyo., Craig, Colo. and Fryse, Ky.



Behind Our Card

Here are the physical resources behind every TEXACO Representative's calling card:

Every Texaco Product, wherever offered throughout the world, is made from The Texas Company's *own* selected crudes, produced from *its own* oil fields

and refined at *its own* refineries.

Equally notable (and valuable) are The Texas Company's vast technical knowledge and long practical experience relating to the manufacture and the necessary working requirements of electric railway lubricants.

TEXACO *Electric Railway* LUBRICANTS

Adequate facilities for speedy delivery
in any quantity, any time, anywhere.

THE TEXAS COMPANY

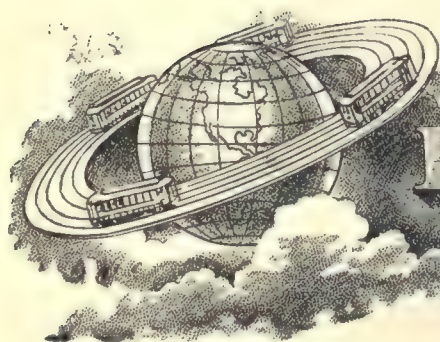
Texaco Petroleum Products

Dept. E4, 17 Battery Place, New York City

OFFICES IN PRINCIPAL CITIES



JUST as the electric railway companies have to compile and be guided by exhaustive statistics as to peak loads, traffic densities, costs per mile, and so forth, we must constantly keep ourselves informed as to purchasing power, density of population and all vital market information in order to maintain our service as an active asset of your service.

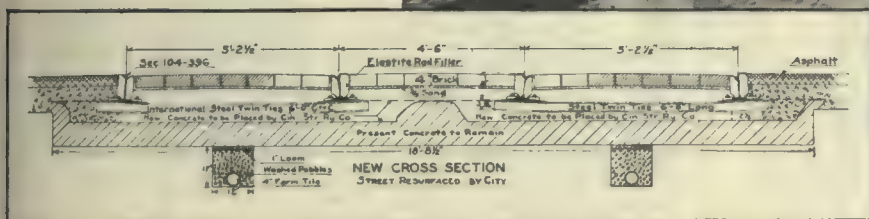


Barron G. Collier

INCORPORATED

CANDLER BLDG. NEW YORK

Carey Elastite System of Track Insulation is a preformed asphaltic compound reinforced with asphalt-saturated fibres. It is impervious to moisture, can be installed at any temperature, and forms a resilient cushion between the rail and the pavement. Slabs are preformed to fit any rail section.



Showing the method of track reconstruction on Reading Road, Cincinnati.

Cincinnati-

a glowing example of traction development

BY June 1, of this year, The Cincinnati Street Railway Company will have completed one of the most extensive improvement programs ever undertaken by a street railway system.

New car-shops—178,000 square feet of floor space! A new power distribution system . . . nineteen substations, ten of them brand-new and all full-automatic—under supervisory control.

Twelve miles of track reconstructed in 1926. Twenty-one miles in 1927.

Twenty-four miles (estimated) in 1928. And The Cincinnati Street Railway Company has made some radical improvements over old methods of track construction . . .

For every foot of this track is protected by a lastingly resilient cushion between the rails and paving. An average, every year, since the beginning of 1926, of *more than three hundred and fifty thousand lineal feet* of rail filler—Carey Elastite System of Track Insulation!

Carey Elastite
TRADE MARK REGD. U.S. PATENT OFFICE

THE PHILIP CAREY COMPANY
Lockland, Cincinnati, Ohio

SYSTEM OF TRACK INSULATION

Pave the Track Areas With Brick

DEFECTS at rail joints can be remedied quickly and cheaply when the track area is paved with brick.

Vitrified brick pavements are durable. The maintenance cost is low. They satisfy all traction and vehicular requirements.

—♦—
*National Paving Brick
Manufacturers Association
332 S. Michigan Ave.,
Chicago*
—♦—

**VITRIFIED
PAVING BRICK**

FACE THE FUTURE—PAVE WITH BRICK

RIGHT ON YOUR DESK—Just the data you want!

Electric railway executives, engineers and operating men have long respected Richey's **ELECTRIC RAILWAY HANDBOOK** as the one great pocket-book of practice data, formulas and tables in the electric railway field. It covers every phase of electric railway work from Roadbed and Track to Signals and Communication.

Richey's **Electric Railway Handbook**

Second Edition

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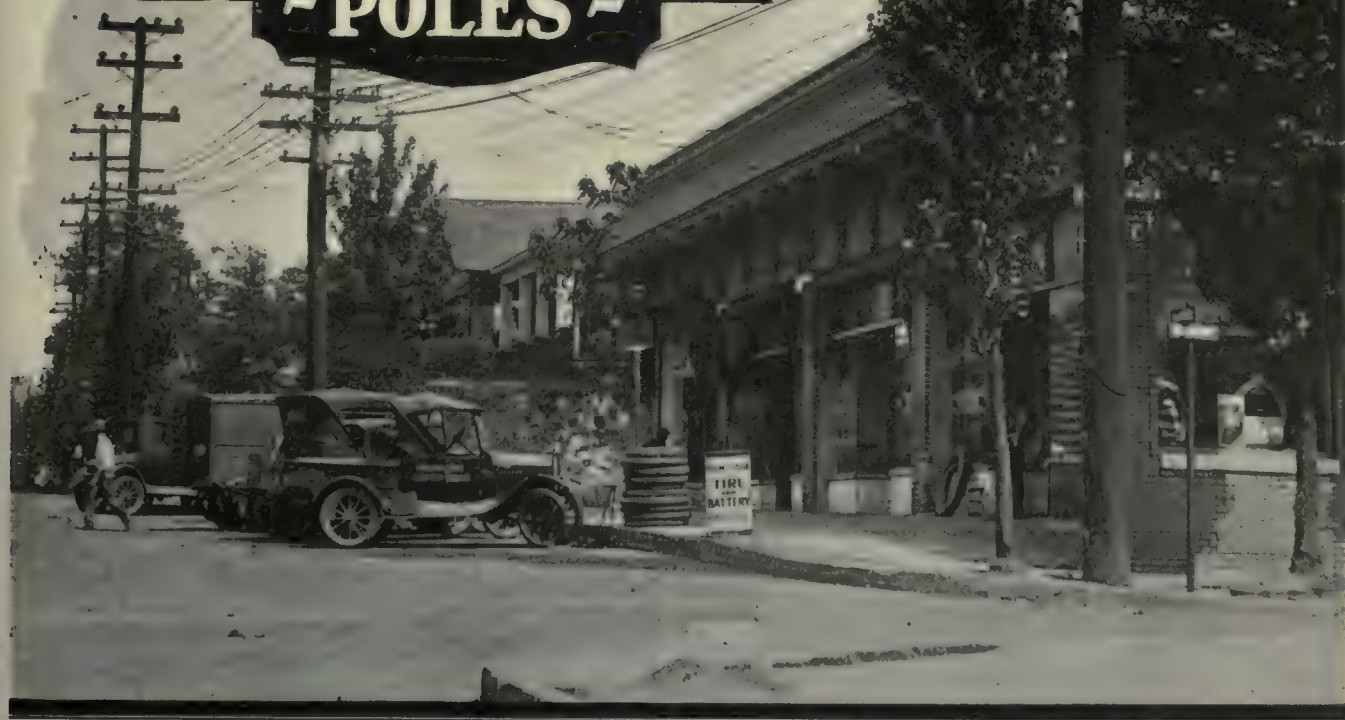
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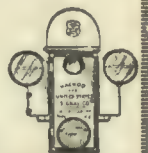
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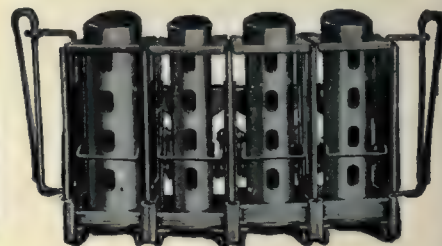
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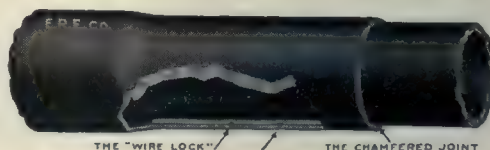
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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912
Of Electric Railway Journal, published weekly at New York, N. Y., for Apr. 1, 1928.
State of New York
County of New York

Before me, a Notary Public in and for the State and county aforesaid, personally appeared C. H. Thompson, who, having been duly sworn according to law, deposes and says that he is the Secretary of McGraw-Hill Publishing Co., Inc., publishers of Electric Railway Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, McGraw-Hill Publishing Co., Inc., 10th Ave. at 36th St., New York, N. Y. Editor, Charles Gordon, 10th Ave. at 36th St., New York, N. Y. Managing Editor, Morris Buck, 10th Ave. at 36th St., New York, N. Y. Business Manager, L. F. Stoll, 10th Ave. at 36th St., New York, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) McGraw-Hill Publishing Company, Inc., 10th Ave. at 36th St., New York, N. Y. James H. McGraw, 10th Ave. at 36th St., New York, N. Y. James H. McGraw, Jr., 10th Ave. at 36th St., New York, N. Y. Donald C. McGraw, 10th Ave. at 36th St., New York, N. Y. Harold W. McGraw, 10th Ave. at 36th St., New York, N. Y. James H. McGraw, Jr. and Malcolm Muir, 10th Ave. at 36th St., New York, N. Y. Trustees for: Harold W. McGraw, James H. McGraw, Jr., Donald C. McGraw, Curtis W. McGraw, Henry W. Blake, 10th Ave. at 36th St., New York, N. Y. Fred R. Low, 10th Ave. at 36th St., New York, N. Y. Mason Britton, 10th Ave. at 36th St., New York, N. Y. Anne Hugus Britton, McGraw-Hill Bldg., New York, N. Y. Grace W. Mehren, 30 West 85th St., New York, N. Y. Malcolm Muir, 10th Ave. at 36th St., New York, N. Y. Trustee for: Lida Kelly Muir, Fred S. Weatherby, 271 Clinton Road, Brookline, Mass. Edwin S. Wilsey, 10th Ave. at 36th St., New York, N. Y. Edgar Kobak, 10th Ave. at 36th St., New York, N. Y. James L. Walsh, 10th Ave. at 36th St., New York, N. Y. Leonard D. & Arthur J. Baldwin, 27 Pine Street, New York, N. Y. Trustees for: Franklin Baldwin, Grace Riker, Cynthia Hazelton, Arthur J. & Leonard D. Baldwin, 27 Pine Street, New York, N. Y. Trustees for: Donald Baldwin The Grosvenor, Inc., stockholders of which are Arthur J. & Leonard D. Baldwin, Inc., 27 Pine Street, New York, N. Y. John R. Dunlap, c/o J. R. Dunlap, Jr., Chandler & Co., 120 Broadway, N. Y. C. McGraw-Shaw Co., 7 So. Dearborn St., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other se-

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5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is (This information is required from daily publications only.)

McGraw-Hill Publishing Company, Inc.

C. H. THOMPSON, Secretary.

Sworn to and subscribed before me this 30th day of March, 1928.

[Seal.] MARTIN J. WIEMER, Notary Public, Queens County, Certificate No. 1819. Certificate Filed in New York County, No. 272.
(My Commission Expires March 30, 1928.)

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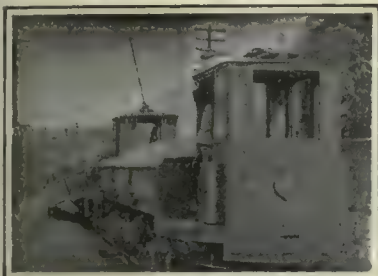
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Note this statement of the Assistant General Manager, "We placed a meter on Car No. 90 and took the readings for nearly three months. Compared them with readings on a 46,000-lb. car on a similar run and found a saving of about 18% in power. The labor cost shows a saving of about 40%. From our observation and from what the trainmen report we feel that many people do ride in No. 90 who have heretofore gone in their automobiles."

*Ask for further facts about
BRILL MODERN CARS.*

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Brill ^{Light}_{Weight} Interurban Cars

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Hill Publishing Company, Inc.

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Cleveland, Ohio

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in
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The new W-N Drive is destined to effect tremendous improvements in electric railway operations. It has been developed by Westinghouse and Nuttall engineers to give to traction companies all the advantages of light, compact, high-speed, high-efficiency motors—less initial investment, reduced maintenance cost, smoother starting, quick acceleration and quiet operating.

Some of the features of the W-N Drive are high ratio of speed reduction, heat-treated hardened helical gears, Timken roller bearings and oil-tight steel gear case.

The advantages of this remarkable drive are so pronounced, you should give it most careful consideration. May we send you complete details?

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The "Last Word" in Power Distribution

IN THESE days of rapid development of all classes of electric railway equipment, "last word" is a strong term to use in presenting any single installation. As used here, therefore, it does not by any means imply that the final chapter has been written on power distribution development.

Nevertheless, the Cincinnati Street Railway is just completing the most comprehensive automatic distribution system with full supervisory control that has yet been installed on a city property. This project is of interest not only because of its magnitude but also because of several difficult operating problems that were encountered.

Harley L. Swift, superintendent of substations in Cincinnati, presents a complete article on this major development in next week's JOURNAL. Don't miss it!

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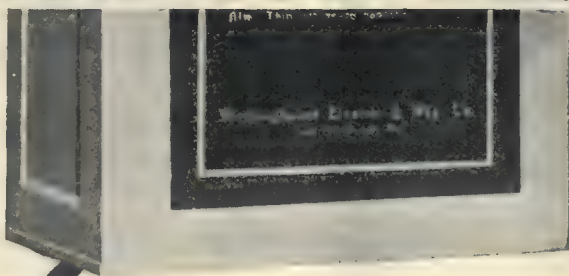
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IN electric railway motor service, insulation must have dependable protection. Westinghouse Varnish No. 335 does more than save the surface—it protects and *insulates*.

Developed especially for the extremely severe service to which railway motors are subjected, Varnish No. 335 has an exceptional vitality that assures protection against the destructive effects of vibration, excessive moisture, and heat. The tough, protective film produced by No. 335 Varnish is a vital factor in prolonging the service-life of railway motors operating under any conditions.

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the United States and Foreign Countries



Westinghouse



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The O-B Trolley Wheel and Harp Make a Big Cut in Maintenance

A BIG portion of ordinary trolley wheel expense is maintenance—frequent oiling and periodical replacement of contact washers and springs.

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A trial of O-B Wheels & Harps on your lines is a mighty good "Dollars and Sense" idea. Furnished in 5-in. and 6-in. sizes with either "U" or "V" groove.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
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Phantom view showing fully automatic graphite lubricating plugs used in Improved O-B Trolley Wheel and Harp.

Ohio Brass Co.



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Soft seats don't cushion bumpy track.

A good car running over good rail has less jounce and bounce than an automobile.

The keynote is "good rail."
The key to good rail is rail grinding.

Railway Trackwork Co.

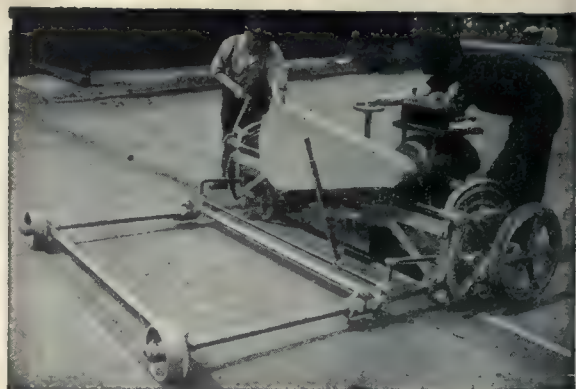
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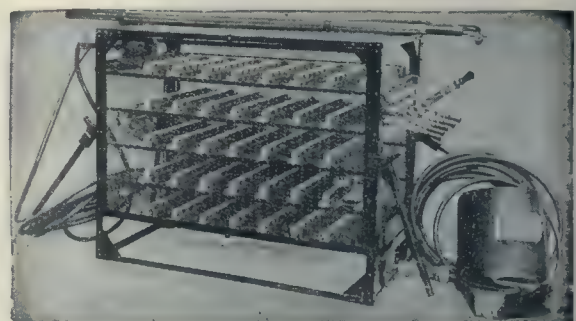
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⊕ 2337

 BETTER RAIL, BETTER TRANSPORTATION



AN INSPECTION TOUR
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An attractive asset for modern cars—

SAFETY DOME TYPE LIGHTING FIXTURES

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Fixtures

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We will be glad to send you full particulars of Keystone Lighting Fixtures and of other Keystone Equipment found on the modern well-equipped car.

Send for ESSCO Catalog No. 7.

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MANUFACTURER OF RAILWAY POWER

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When transportation conditions impel shorter headway between cars to reduce waiting time of patrons . . . quicker brake applications to reduce time consumed in making stops . . . rapid interchange of passengers to cut down standing time . . . prompt release of brakes to permit quick get-away . . . THEN the Safety Car Control Equipment will help speed up the service while maintaining the basic element of safety.

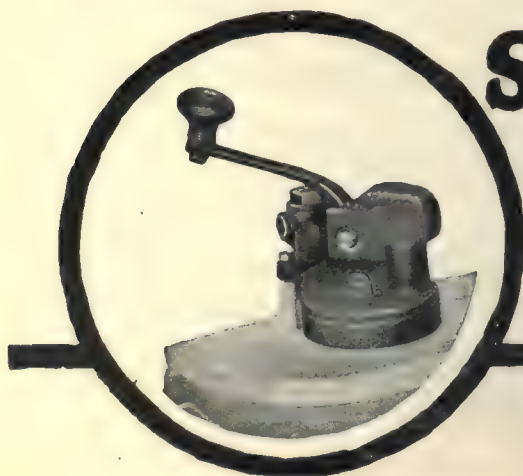
The illustration shows one of the ten modern light weight cars now being used by the Nashville Railway and Light Company. Each car bears the name of a distinguished Tennessean. All of these cars are themselves rendering distinguished service because they by nature have the common name of SAFETY CAR.

This is the modern equipment for modern cars.

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

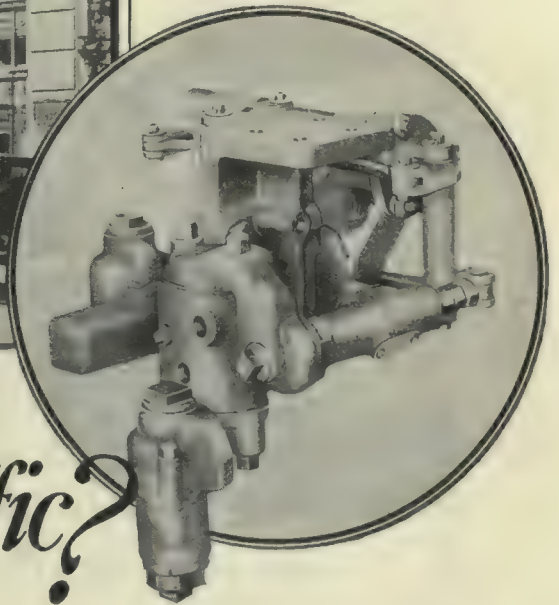
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The Westinghouse Variable Load Brake is an attachment for use with straight air or semi-automatic equipments by means of which the brake cylinder pressure is automatically adjusted as the car weight changes, to provide the same retarding effect throughout range of passenger load.



*Can your cars
lead the traffic?*



Confer with our representative regarding the desirability of Westinghouse Variable Load Brakes for your new cars.

WHEN thoroughfares are congested . . . when other vehicles are contending for the right of way . . . when traffic demands are greatest . . . are your cars as mobile as other conveyances that use the streets . . . can they lead the traffic rather than lag behind?

They can if equipped with the Westinghouse Variable Load Brake. This modern brake for modern cars is as effective on loaded cars as on empty cars and assures uniformly short stops under all conditions. It furnishes adequate control to enable cars to hold their place in the traffic stream.

WESTINGHOUSE TRACTION BRAKE CO.

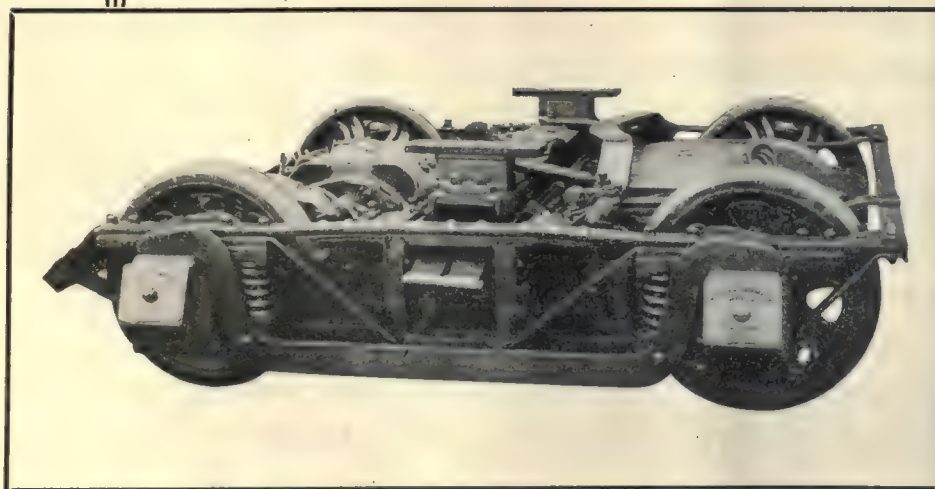
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WESTINGHOUSE TRACTION BRAKES

Riding Comfort *must be* "built in" Modern Cars

CAR modernization is not a matter of dressing up old designs with spring cushioned seats and De Luxe interiors. Appearances alone, will not decrease operating expense nor increase revenue. Riding comfort for instance, the most essential factor in public attraction, must be built in from the ground up.

Cummings No. 62 trucks have contributed largely to the riding comfort of our cars.



Cummings No. 62 low body Truck for city and interurban service.

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Successors to McQuire-Cummings Mfg. Co.

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Look out!

AKRON

789

Twin Coach



T20-450

Motors in front will be obsolete

Edward Dana



The motor bus can be a very useful vehicle as an auxiliary to mass transportation systems and the development of the Twin Coach at this time is in my opinion most fortunate.

Patrons now appreciate the extent to which motor buses can be made effective, but are dissatisfied with the riding qualities, uncomfortable entrance and exit facilities and capacity of the conventional types thus far rendering the service.

The Twin Coach combines capacity, reliability, flexibility and a street-car appeal which I feel will have a marked influence upon the extent of bus operation and the welcome accorded buses by patrons from now on.

*Note:
This opinion has since
been backed by an order
for ten Gas. Electric Twins!*

Edward Dana

General Manager

BOSTON ELEVATED RAILWAY CO.

Compares TWINS vs OTHER TYPES



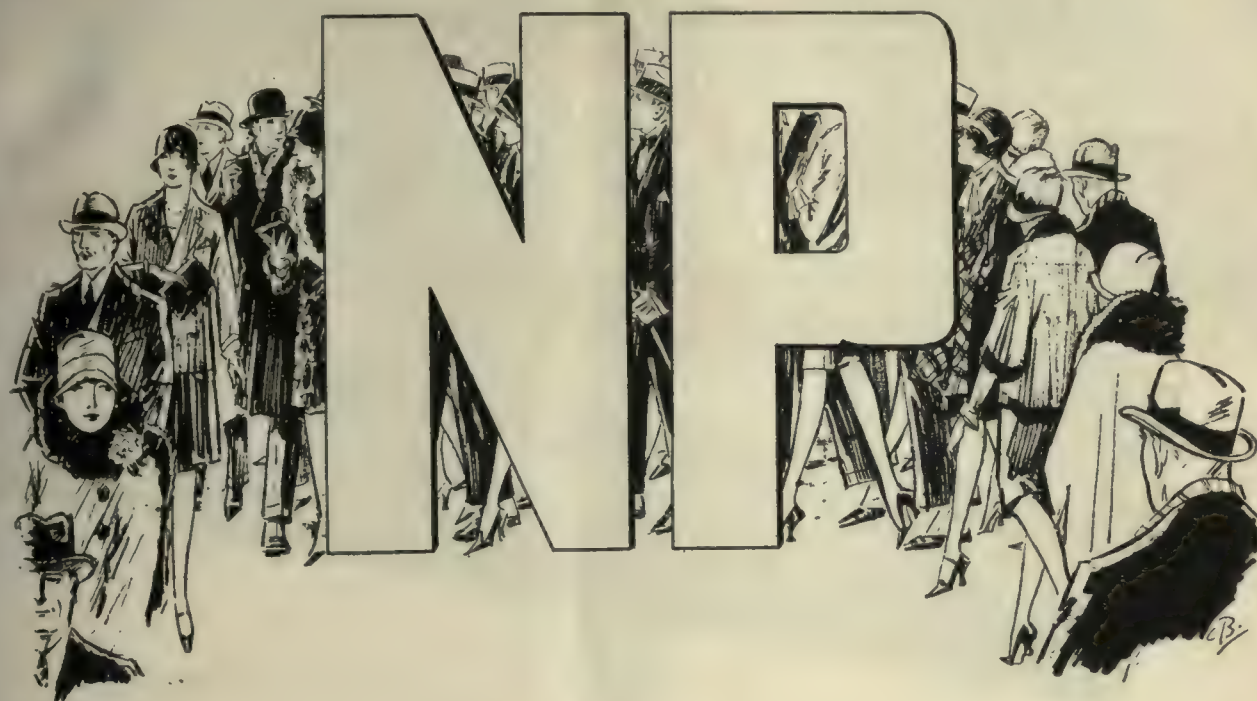
Eighteen money-making Twins are at work for the Northern Ohio Power and Light Company at Akron, Ohio—Twelve are serving the workingmen at the great tire plants—Six are winning increased daily patronage on inter-city runs between Cleveland, Akron and Canton.



Two Millions Invested IN TWIN COACHES In 9 Months



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MOST SIGNIFICANT
VEHICLE in all 1928 TRANSPORTATION



FOLLOW THE CROWD
the widespread adoption
of NP Treadles must mean that
many operators find in treadle
operation a method of quicker
interchange of passengers—
circulating load—greater economy
and a mechanism that
appeals to car riders



NATIONAL PNEUMATIC COMPANY

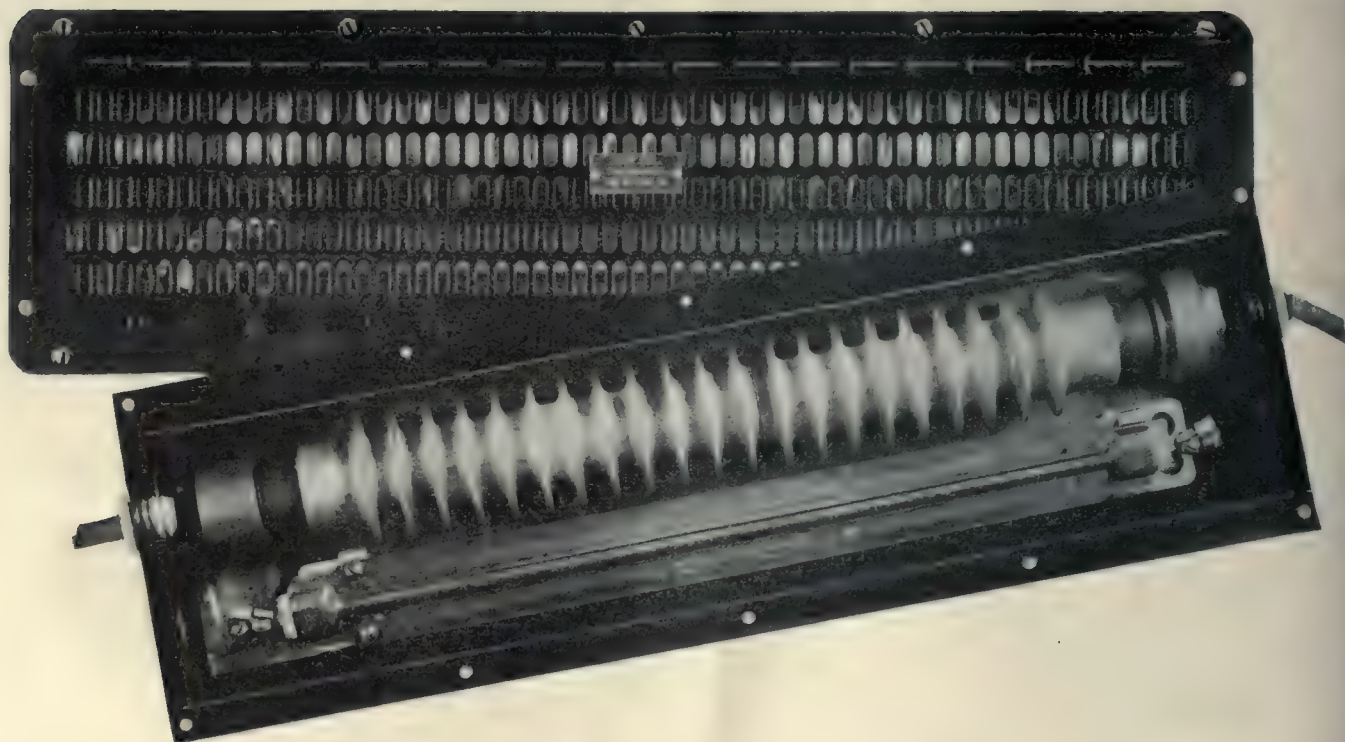
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Use the Waste Energy of Control Resistance in Consolidated Motor Resistor Heaters

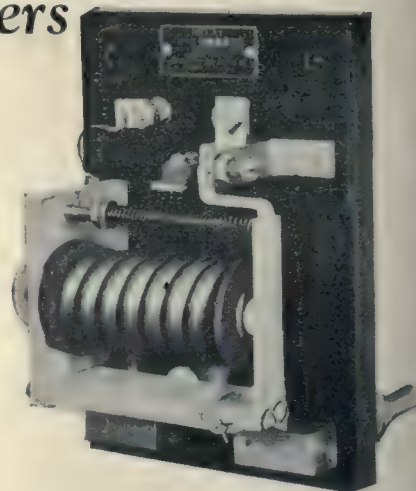
The Consolidated Resistor Heater utilizes the heat now wasted in the grids. These heaters have the same resistance values as the grids under the car which are used in the summer. Consolidated heaters contain a motor resistor and also a standard heating element as a compact unit. The regular heaters are cut off whenever the resistor heaters are operating, unless they should be cut off by the thermostat. These heaters with peak load relay, illustrated at the right not only utilize the energy formerly wasted in the motor resistors, but they cut the heater load off the peak when cars are accelerating.

The twenty-five articulated trains and the fifty motor cars now under construction for the Cleveland Railway are being equipped with the new Consolidated Motor Resistor and Sheath Wire Heaters.

For cars now equipped with electric heaters, the Consolidated Resistor Heater can be furnished as a separate unit.

It will pay you to investigate this latest Consolidated contribution to car heating.

Consolidated Motor Resistor Heaters can be used for regenerative braking resistors as well as for the accelerating resistors.



The Peak Load Relay

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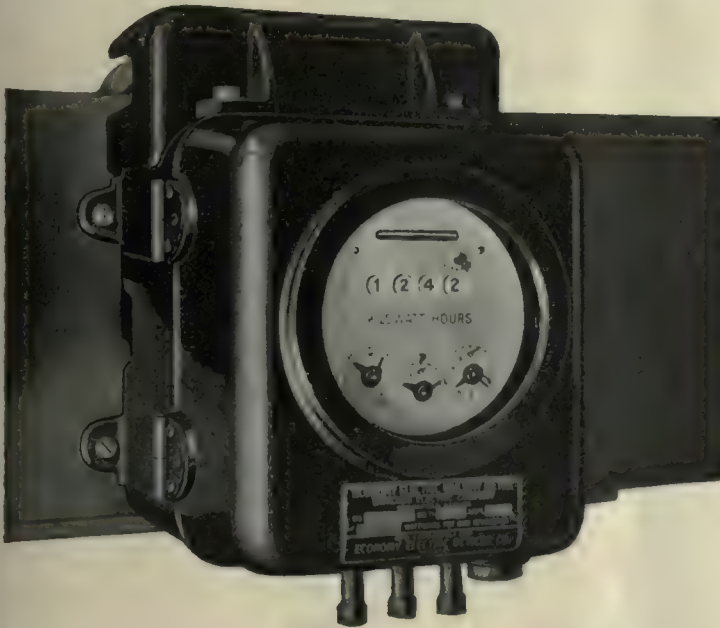
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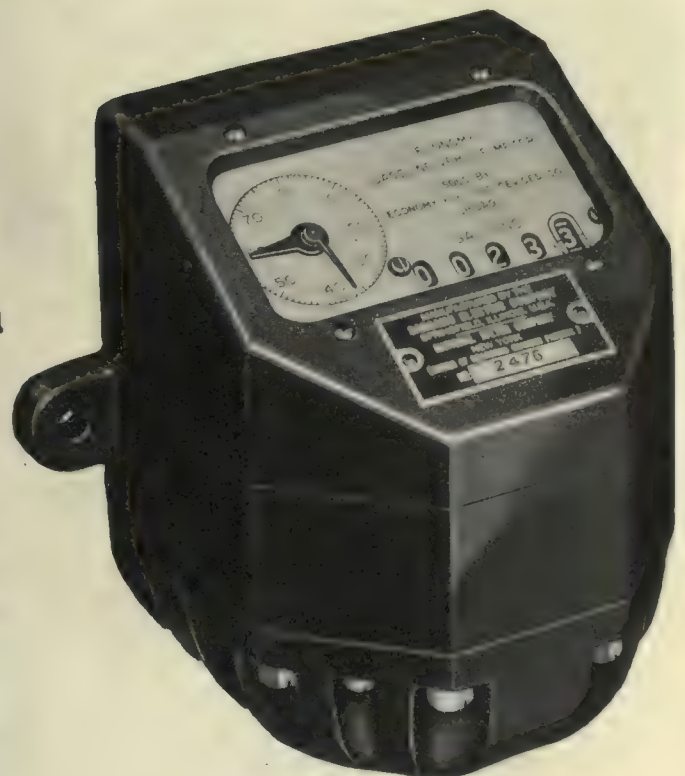
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Electric Railway Journal

McGraw-Hill Publishing Co., Inc.
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Consolidation of
Street Railway Journal and
Electric Railway Review

CHARLES GORDON
Editor

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Not Enough Comparison of Maintenance Costs

COMPARISONS of maintenance costs on various properties give an opportunity to determine whether one's own practices are in line with those in use elsewhere, and whether possibilities have been overlooked for doing the work better or at lower cost. Of course such comparisons, to be of maximum value, must be considered along with those of service reliability. Any maintenance executive can cut down his costs for a time by deferring necessary work and sacrificing reliability. But when the records are studied over any extended period the shortcomings of such practices are bound to make themselves evident.

Maintenance costs are not interchanged among electric railway properties as generally as they should be. Maintenance men have not given the matter the attention it deserves, for a number of reasons. While the standard classification of accounts is almost always used the details are not always comparable. The physical conditions of properties vary widely and have a direct bearing on maintenance costs. Then all too often there is a lack of appreciation of the value of studying the other fellow's figures and methods. Even some of those who interchange data have not obtained the maximum benefit because of failure to analyze the figures and to effect needed changes in their maintenance methods that are obvious to an impartial observer.

The cost per unit is not in itself a conclusive measure of excellence. Either high or low figures, considered abstractly, mean little in themselves. Variations in accounting as between depreciation or renewal reserves and operating maintenance accounts cause some difficulty in making comparisons. Other causes of variations in costs are the age, type and state of repair of the cars; the supervision and shop facilities, and the operating characteristics of each company. For instance, the total cost of equipment maintenance for the properties in the Electric Railway Association of Equipment Men, Southern Properties ranges from \$13.67 to \$30.46 per 1,000 car-miles, while cost of labor for cleaning and inspection ranges from \$6.59 to \$17.38 per 1,000 car-miles.

On the other hand, costs that are out of line must not be waved aside with the general and time worn excuse of "local conditions." High figures should be considered the signal to look for expensive practices or those that are failing to give satisfactory results. Sometimes high maintenance figures are in no way a measure of the efficiency of the maintenance departments themselves but are traceable to operating practices and management policies that need correction. In that event the man responsible for maintenance may not be in a position to correct the difficulty directly, but he holds the

key to opening up general questions of policy that affect directly his own performance. For these reasons he should seek rather than avoid the interchange of maintenance figures with other properties even though his own figures may seem to be high.

Regenerative Heating Shows Attractive Savings

RECOVERY of the energy that is wasted in the car resistors during acceleration with series-parallel control, and the energy which is stored in momentum and is absorbed in the brake shoes when the car stops, presents an opportunity for economy that has attracted many engineers. Regeneration of the kinetic energy of motion into electrical energy and its return to the distribution system is entirely possible, and it has been adopted with advantage on several of the heavy railroad electrifications. But for street cars and light interurbans recovery of this energy is not so simple. The series motor, which is universally used in this class of service, is not readily adaptable to serve as a generator for feeding back energy to the line.

A substitute proposition which has been tried with some success at various times is the use of regenerated electrical energy for heating the cars. While in temperate climates this opportunity is available during the winter months only, the expenditure for heating is a very considerable portion of the energy used throughout the year, sometimes running as high as 8 to 10 per cent of the total. The regeneration of energy serves an additional purpose in that it directly relieves the brake shoes of a portion of the work they are ordinarily called on to do. This makes possible either a higher braking rate or less wear on the shoes and wheels, so that even in the summer when the heat is not needed the use of dynamic braking, with the motors acting as generators, is advantageous.

Various difficulties are involved in the dynamic braking system. The rate of braking must be controlled, and since the voltage of the motors falls off rapidly as the speed is reduced, the resistance in the circuit must be changed continually as the car comes to rest. According to an article by A. W. Baumgarten, appearing in this issue, these problems have been successfully met in the installation which has been made in the experimental car of the Chicago & Joliet Railway. Both manual and automatic control are used through remote-controlled contactors, making the system flexible. Duplicate sets of resistors are installed, so that the heat can be used inside the car or discharged to the atmosphere beneath it. The heat released during acceleration is also utilized along with that produced during braking. With both together and without any external source the car was heated to a temperature of 60 deg. during winter weather. For a

short period in the early morning, prior to going out on the run, additional heat from the line was used, but this was turned off while the car was in service.

As a measure of the value of this method, Mr. Baumgarten estimated that the cost of heating a car with standard electric heaters is \$501 per season, while with the regenerative system it is \$200—a saving of \$301, after making allowance for all charges on the extra equipment. This will be augmented by savings in the electrical distribution system, bringing the total up to some \$400, according to the author. Such a saving is well worth making, if the motors are of sufficient capacity to stand the additional service, and if it does not involve any great complication in apparatus or impose added duties upon the operator.

Putting Truck Overhaul on a Production Basis

PLACING car truck overhauling on a production basis is advantageous, particularly for the larger electric railways. With them, the quantity of this work makes it necessary to prepare definite schedules for overhauling, which must be adhered to closely. One of the greatest problems is that of cutting down non-productive hours. The work may be classified into dismantling, repairing or replacing worn parts, assembling and testing. When several men work on the same truck, one will interfere with another. This results in waiting and unproductive time. If replacement parts are not at hand the workman must wait for the material or leave his place to get it.

Unless there is the necessary labor-saving equipment production will slow up at the end of the working period, due to physical fatigue of the men. Material handling equipment is needed, as most of the parts are heavy and hard to place with the accuracy needed to insure good performance. The various operations must follow progressively and without delay, else one man may interfere with others who are to follow him. Order and system are essential, and the work should be laid out so that the various operations become standardized. Each man can then become an expert in his particular duties, and the work will be done better and quicker due to greater familiarity and skill.

An outstanding example of constructive planning and systematizing of truck overhaul is found in the new Coney Island Shops for the Brooklyn-Manhattan Transit Lines, an article on which appears in this issue. One is impressed particularly with the number of one-man jobs into which the work is divided. One man removes the heavy parts with the aid of an overhead crane. Another does the cleaning in a room provided with chemical and rinsing tanks. A third man cuts off rivet heads holding parts to be replaced, and so on. There is no crowding of workmen or materials. Only a single job is done on a truck frame at one time and there are enough trucks ready to be worked on so that a man can proceed from one to the next without waiting. Free stores adjacent to the work are kept stocked with all parts needed. Balanced production makes it easy to order material far enough in advance to assure its being on hand when needed. Proper routing of work and the group arrangement cuts down rehandling and lost time.

An important factor in the success of this method is the design of the shop building, which was planned with quantity production in view. All tools and equipment needed are available and there is close supervision.

Attention is given to constructive planning and scheduling. With such provisions the force necessary to carry on the work is surprisingly small. The reduction in labor costs and in the elimination of lost time will pay a handsome return on the necessary investment in spare trucks and parts.

Bus Maintenance Calls for New Standards

DEVELOPMENT of bus mechanisms has been along entirely different lines than those through which the street car has progressed. Going back to the early days, the horse car was about the simplest vehicle that could be devised for its purpose. Its working parts were few and rugged. Nearly all of them could be built by a blacksmith and repaired by him. Naturally the transition to electric drive at a period when the electric motor was still in its infancy resulted in the retention of a good deal of the same philosophy, and much of it remains in the present-day cars and in the mechanics who repair them. Parts are sturdy and rugged, but many of them lack refinement in detail. Clearances are large and a considerable variation is permissible in fitting. There is much hand work and many parts are not entirely interchangeable. This is particularly true after the car has been through the repair shop several times.

Contrast this with the development of the bus, which is a product of the automotive school. Based on quantity manufacture, the parts are turned out by automatic or semi-automatic machinery. They are correct to size within a few thousandths of an inch, whereas in railway practice allowable variations may be measured in sixty-fourths. The general use of anti-friction bearings, high grade alloy steels and finely finished surfaces in bus parts introduces new standards of workmanship and tolerances.

When it comes to repair work similar differences are noticeable. Many bus engine parts, for instance, are not reconditioned but are replaced with new ones, while railway parts are restored to their original condition as nearly as possible and returned to service. Naturally this wide departure in practice calls for workmanship of a radically different character. The bus maintenance man does more assembling and less repair work than his railway brother. But he must work within closer limitations, and must be, generally, a mechanic of an entirely different type.

Another Setback for Suburban Transit

IMPROVEMENT of transportation facilities for commuters from New Jersey, Westchester and Long Island to New York City has received another setback in Governor Smith's veto of the Mastick bill. This bill would have given official sanction of the state of New York to the studies of suburban transit now being made by the Port of New York Authority. Approval by the state of New Jersey already had been given. Despite a certain amount of objection on the part of New York City authorities, the State Legislature had passed the Mastick bill. The Governor, however, refused his signature, and there the matter rests.

Something must be done, and done quickly. No one denies that. The volume of suburban traffic into and out of New York City outgrew the transportation facilities years ago. The growth of traffic continues, but the expansion of facilities proceeds at a snail's pace. It is equally plain that a bi-state body is required to solve this problem. The flow of passengers from New Jersey

to New York City is greater than that from all the other suburbs put together. Attempts made several years ago by the North Jersey Transit Commission to solve the problem showed that one state cannot do it alone. Therefore the Port Authority, an existing agency of interstate character, was called upon for aid. The members of that body were willing enough to tackle the job, and New Jersey was willing to let them do it, but New York has balked. What the next move will be is problematical.

Opinions differ as to whether the Port Authority is the agency best qualified to handle the suburban transit problem. The Governor intimates that it has enough to do with bridges, railroad freight movement and port planning. On the other hand, much of the passenger traffic moves over the same rails as the freight. The railroad officials with whom the Port Authority has been dealing for several years are the ones who are responsible for passenger movement. The Port Authority is already familiar with many details of the suburban transit problem. Moreover, since the Port Authority is the only bi-state agency of its kind now in existence in the Metropolitan district, it would seem better to give it the job rather than to await the creation of an entirely new agency. By disapproving of this expansion of its activities, the Governor of New York has dealt a serious blow to hopes of early improvement in suburban transit facilities.

Track Cost Is Important Element in Considering Car Replacements

IN MOST discussions of the advantages of new electric railway equipment, consideration has been directed primarily to the probable reduction in car operating costs and the effect upon railway patronage and public relations. These are, of course, outstanding considerations. But in addition there is a definite relation between car design and the very important factor of track costs. Far too little attention seems to have been given to the possibility for making substantial reductions in track investment and maintenance costs through the use of lighter electric railway rolling stock, reductions in unsprung weight and general improvements which may result from the use of more effective springs designed to reduce the shocks and impacts transmitted from the moving car to the track structure.

Consideration of track costs, as we know them today, opens a broad field for speculation as to the economies possible by improved design of electric cars. Special work, in particular, accounts for heavy expenditures in both construction and maintenance. Anything which will reduce the impact of heavy cars pounding over crossings, switches and frogs is bound to result in substantial economies.

One great obstacle to an evaluation of the effect of car design upon track costs lies in the difficulty of measuring this relationship. Only after years of painstaking observation and experiment can even an approximation be obtained of the economies to be expected. Even then it would be hard to translate the effects of car weight and spring design into terms of track dollars. Not only does track in paved streets carry the cars for which it is intended, but it frequently carries heavy vehicular traffic as well. Any move toward lighter rails and foundations that might be made possible by improved cars would necessarily have to be made slowly and cautiously, since in large measure satisfactory track construction is

developed through the empirical process of experience. It is at best, therefore, a slow proceeding. There is no question, however, but that the effect on track costs is an important factor that must be taken into consideration in judging the results to be expected from new cars.

Lightning Arresters Require Regular Inspections

WITH the arrival of the summer months come frequent electrical storms and the attendant danger to electric railway equipment. While all power equipment and nearly all cars have some form of lightning protection, it must be maintained properly if it is to serve its purpose at the critical moment. It is particularly important, therefore, that protective apparatus not only be inspected prior to the season of thunderstorms, but also that a regular inspection schedule be adopted and rigidly followed. It is necessary, too, that a type of arrester adequate to the service in which it is used be installed and the proper method of testing be employed.

Some knowledge of what happens in the electrical circuit when static electricity makes itself evident is necessary to an intelligent program of lightning arrester maintenance. Accumulated static electricity in the clouds either strikes the system directly or releases bound charges; the second being the more frequent occurrence. Another source of danger is the internal disturbance. The discharge of energy from inductive circuits of motors at the time of switching often punctures the insulation. Few railway men appreciate that the arresters are protecting their equipment from such charges as well as from lightning.

The type of arrester to be selected depends on the severity of discharges from which protection is needed. The electrolytic or aluminum cell arrester is the most effective, although the spark-gap porcelain-inclosed type is favored in sections of the country where lightning storms are not severe, because of its lower first cost and simple maintenance. Whatever type of arrester is used on a car, it should be protected from rain and wheel wash. It is most essential that it provide a direct path from trolley to ground. If electrolytic arresters are kept in service all winter they should be installed inside the car to prevent freezing.

Every arrester requires regular inspection and maintenance, especially during the summer. Spark-gap arresters should be examined after every electrical storm and any damaged units replaced. Carborundum blocks of the multipath type need periodical inspecting, and gap settings for the higher-voltage carborundum arresters, which use a small gap in series with the block, need checking.

With the electrolytic arrester a regular routine of inspection should be adopted and adhered to rigidly. A small current flow is needed to maintain a film on the cell plates. On this account the cells must be charged frequently and kept in balance, particularly if of the three-cell type. The arresters themselves need testing at least once a month during the summer. For this purpose a testing set such as that devised in New Orleans and described in this issue is of value. It is good practice to take the arresters apart for storage in the winter, wash the plates and the jar and throw away the used electrolyte and oil.

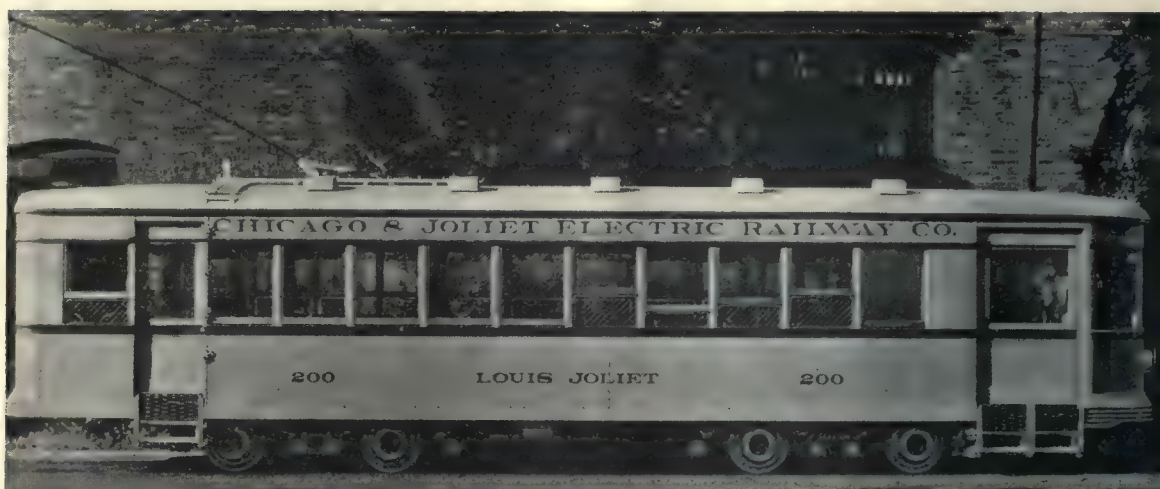
Lightning arresters are very necessary pieces of equipment, but improper installation and lack of maintenance can nullify the protective value of any type.

Energy from Dynamic Braking Cuts Heating Costs

System of heating using regenerated energy along with that wasted in acceleration succeeds in Blackhall car. Manual control superimposed on automatic lends flexibility without interference with regular air braking

By A. W. Baumgarten

Division Engineer Chicago & Joliet Electric Railway, Joliet, Ill.



The heating tests were made on the car "Louis Joliet," which was exhibited at last year's A.E.R.A. convention

ELECTRIC heat in railway cars has long been considered the most desirable, but its cost has sometimes been considered prohibitive, particularly where the average winter temperature is less than 40 deg. F.

For this reason the Chicago & Joliet Electric Railway has for many years used fuel heaters in its city and interurban cars. Within the last few years a number of railway properties, such as the United Railways & Electric Company of Baltimore, the Twin City Rapid Transit Company, the Pittsburgh Railways, and others, have tried several plans of utilizing the waste energy of motor rheostats for car heating. Naturally, this afforded considerable reduction in heating costs, for the only additional cost is an investment in inclosed resistors which can be installed safely within the car. However, except in very mild climates, additional heaters using power from the trolley are needed in conjunction with motor rheostatic heating. With no additional heaters, in colder weather the operator would be tempted to run on resistance points to maintain a comfortable temperature in his car.

Some years ago the writer conceived the idea of utilizing waste energy of starting resistance losses for car heating, together with the much greater waste energy of braking. This necessitated the design of a dynamic brak-

ing system whereby the driving motors would become generators so that energy therefrom could be dissipated through the same motor rheostats. Although dynamic braking was not new the automatic control and use of this waste energy for car heating had not previously been used to any extent.

SAME CONTACTORS USED FOR ACCELERATION AND BRAKING

This dynamic braking and heating scheme has been incorporated in the motor control of the new light-weight worm-drive car of the Chicago & Joliet Electric Railway that was exhibited at the Cleveland convention of the American Electric Railway Association last October. This car was put in regular city service in February.

Both motor acceleration and dynamic braking are controlled with standard remote contactors and a standard master controller. Only three additional contactors are needed for the dynamic braking. In braking and heating the contactors are actuated by an automatically controlled sequence drum that is interlocked with the motor controller and brake valve. This dynamic braking sequence drum automatically cuts out heater resistance as the car speed decreases. Its rate of movement is controlled by a current-limiting relay carrying the main generated current. This current-limiting relay prevents overloading of

TABLE I—DYNAMIC BRAKING TESTS ON CHICAGO & JOLIET WORM-DRIVE CAR NO. 200, NOV. 16, 1927

M.P.H.	Time, Seconds	Maximum Volts, Two Motors	Amperes per Motor Average	Maximum	Weight of Car, Pounds	Braking, M.P.H.P.S.
22.5	11.50	...	81	120	26,100	1.96
22.0	9.80	...	82	120	26,100	2.25
12.0	5.33	...	85	140	26,100	2.25
21.4	8.98	...	96	132	26,100	2.39 *
21.0	7.77	...	104	140	26,100	2.70 *
20.0	7.57	...	93	132	26,100	2.65 *
13.0	6.82	340	78	140	26,100	1.91
12.7	5.98	340	79	140	26,100	2.12
20.8	7.90	545	100	132	26,100	2.63
21.7	8.33	545	95	132	26,100	2.60

* Maximum relay setting.

the motors while they function as generators during braking.

The starting and braking resistance units consist of edgewound resistors entirely inclosed in aluminum cases. These are placed under the car seats in box-type aluminum seat pedestals having louvers on all sides to allow free circulation of air. The seat pedestals prevent the passengers from placing their feet on these heaters, some of which reach quite high temperatures. A second set of open-type resistor units is placed under the car body for summer use when heat in the car is not desired. The change from inside to outside resistors is made by a six-pole, double-throw switch under the car. The aluminum cases of the heater resistors are grounded through a relay so that should any part of the resistor circuit open or become grounded the control circuit will be opened.

The motor equipment on this car consists of four 300-volt motors, with pairs connected permanently in series. This simplifies the dynamic braking control, for the load of the four machines, when acting as generators, can be divided equally by interchanging fields of the paired motors.

The dynamic braking action is governed by the standard safety-car control air valve in which there is an extra port between the release and air application positions of the valve. A circuit-closing air valve is connected to this port, so that when the car operator moves the brake valve to the proper position this air valve closes the dynamic braking control circuits. The remainder of the braking operation functions automatically. Any desired rate of braking can be obtained by changing the setting of the current-limiting relay.

Dynamic braking does not in any way interfere with air braking and, if desired, air braking may be used at the same time as the dynamic braking. Also, the car operator can at any time cut off the dynamic braking and reduce car heating by throwing a snap switch placed alongside the master controller. A manual control, obtained through a foot switch, is superimposed on the automatic control of the brake so that the car operator can stop the movement of the sequence drum and use as much or as little braking as desired. This manual control enables the operator to coast down steep grades using the dynamic brake without bringing the car to a stop.

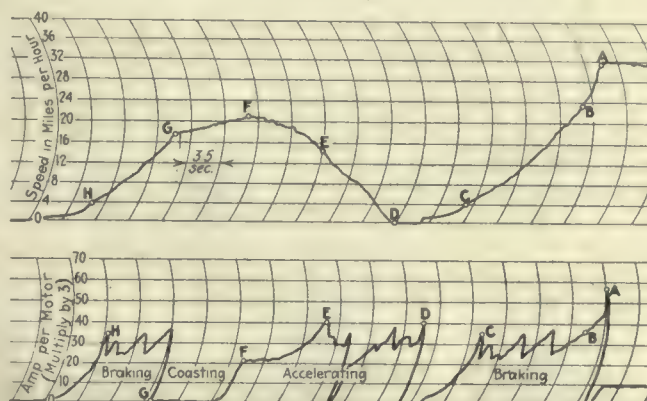
TABLE II—DYNAMIC AND AIR BRAKING COMBINED, WORM-DRIVE CAR NO. 200, ON NOV. 18, 1927

M.P.H.	Time, Seconds	Amperes per Motor—Average	Maximum	Weight of Car, Pounds	Braking, M.P.H.P.S.
21.5	5.54	89.6	138	25,200	3.88
21.0	5.90	82.1	147	25,200	3.56
22.0	5.20	88.9	147	25,900	4.23
19.0	4.73	84.3	136	25,900	4.02
19.0	4.78	89.5	140	25,900	3.97
20.2	5.13	79.1	150	25,900	3.94
20.2	5.40	84.2	148	25,900	3.74
20.0	5.04	82.8	138	25,900	3.96

Previous to putting this light-weight car in regular service a long series of tests was made by engineers of the railway and the Westinghouse Electric & Manufacturing Company. The car was equipped with high-speed Esterline twin type graphic meters, recording simultaneously combinations of car speed and motor current, motor current and line voltage, and generator current and voltage. Indicating thermometers in the car and thermocouples installed in the motor windings determined the temperature. Recording watt-hour meters in the circuits recorded energy consumption and energy returned to the car in heating.

NO DELAY IN ACTION OF DYNAMIC BRAKE

Typical speed-time and current-time curves obtained during acceleration and dynamic braking are reproduced. At the right of point A on the curves the car was running at a speed of 32 m.p.h., with a current of 30 amp. per motor. Power was shut off with the brake valve in dynamic braking position. The time interval to obtain maximum dynamic braking, as indicated by the break in the motor-current curve, was only 0.65 second.

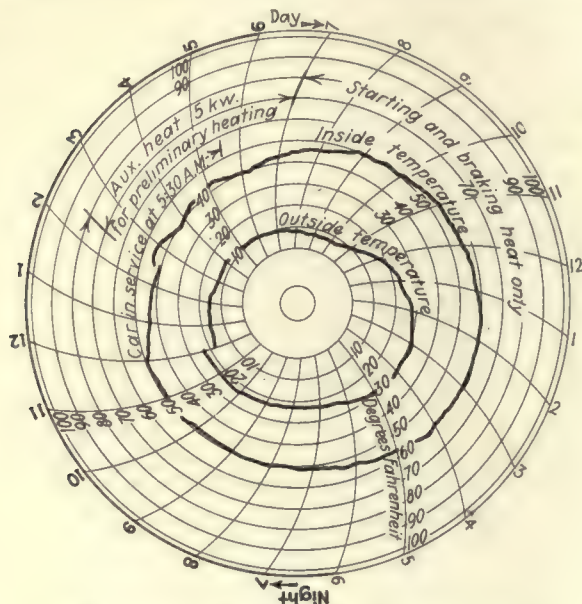


Typical speed-time and current-time curves with dynamic braking obtained in Chicago & Joliet tests. These curves, reading from right to left, show car speed and current per motor. Chart speeds in the tests were 3.5 seconds per vertical division

The points indicated at A, B, C, etc., on the corresponding curves are identical time points. No air braking was used except to stop the car after reaching a speed of less than 2 m.p.h. Although the speed of 32 m.p.h. at point A is abnormally high the maximum motor current in braking is only about 174 amp. The braking rate between points A and B is about 3.33 m.p.h.p.s., and between points B and C it is 2.03 m.p.h.p.s. As shown on the motor-current curve, the advance from each dynamic braking point to the next occurs at the same speed each time the car is stopped when the current relay setting remains fixed, and the rate of braking is always the same on level track.

The dynamic braking in all cases was extremely smooth, as can be noted from the speed-time curves. By setting up the current limiting relay, high braking rates were obtained without discomfort. The results of a number of tests using various speeds and relay settings are given in Table I. In a large number of tests where the average braking rate was 2.36 m.p.h.p.s., the average motor current was 87 amp., whereas the average motor current for the corresponding rate of acceleration is about 137 amp. On this basis the average braking currents are found to be about 63 per cent of those for average acceleration. The maximum voltage developed across two motors when braking from a speed of 28 m.p.h. was 545 volts, which is less than trolley voltage.

Table II shows results obtained when using dynamic and service air braking simultaneously. A maximum retardation of 4.23 m.p.h.p.s. was obtained without wheel slippage. On tests made with air braking only, such high rates of retardation were not possible, and wheel slippages occurred at rates less than those shown in Table II, even with sand on dry rails. The reason for such a difference would appear to be that air brakes cannot be adjusted equally on all wheels and, with the air braking, one or more pairs of wheels will slide at high braking rates. When using both forms of braking at high rates the air braking is only about 50 per cent of the total—not sufficient to slide the wheels—and the remaining 50



Temperature curves obtained on March 5, 1928

Car was put into service at 5:30 a.m. after preliminary warming with auxiliary heaters. Resistors used for starting and dynamic braking then supplied sufficient heat to maintain an interior temperature approximately 30 deg. F. above outside atmosphere.

per cent of dynamic braking is fully equalized between all the wheels. In fact, tests on very slippery rails showed that with dynamic braking it was not possible to slide all the wheels at once; those that did slide started to turn again in a short distance. Better rates of retardation appear possible, consequently, on bad rail with dynamic braking.

With thermocouples in the motor windings separated from the copper with only one layer of tape, tests were made on a predetermined schedule of six stops per mile. A six-hour run of a loaded car was made on a schedule of 11 m.p.h., using dynamic braking only. The same tests were repeated using air braking alone. With dynamic braking the maximum motor temperature was 83 deg. C., as compared with a maximum motor temperature of 73.5 deg. C. with air braking. These are practically hot-spot temperatures. Since the permissible temperature rise is about 100 deg. C., it is highly improbable that dangerous motor temperatures would be reached during winter as a result of dynamic braking. While not very accurately determined, due to the wide variation in voltage, the tests showed about 8 kw. was the average return of power, to which must be added the loss in the resistors from accelerating currents, or about 20 per cent of the total input.

Since putting the car in regular service last February it has not been necessary to use any heating beside that derived from the dynamic braking and the accelerating resistance losses. The car is equipped with auxiliary

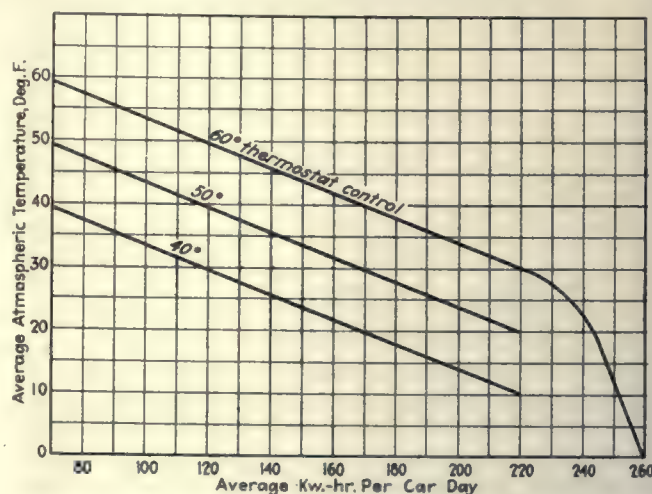
heaters of 5 kw. capacity on a 50 deg. F. thermostat control. These are turned on about two hours before the car is scheduled to leave the barn to have it warm in the morning.

A typical temperature chart taken in the car while in regular service on March 5 is shown in the accompanying illustration. The outer curve is the recorded temperature inside the car, while the inner curve gives the outdoor temperature, plotted from a similar temperature record taken on the same day. The car was put in regular service at 5:30 a.m. with an inside temperature of 40 deg. F. obtained with the auxiliary heaters, and an outside temperature of about 12 deg. A temperature of 50 deg. and more was maintained in the car, using the starting and braking heat only, with an average outside temperature of about 20 deg. In general, it has been found that the average temperature rise obtained with dynamic braking and starting rheostat losses is about 30 to 35 deg. During stormy weather and when passenger loading is heavier, higher temperature rises occur. Except in extremely cold weather, the heat obtained from braking and starting is ample to maintain a comfortable temperature in the car.

SUBSTANTIAL ECONOMY IN HEATING OBTAINED

Several years ago the railway operated a few cars with electric heaters on 60 deg. thermostat control. Meters were installed in the heater circuit of two of these cars and accurate records kept of the heating energy for two seasons. Table III shows the heating energy, the motor energy per car-mile and the average heating energy per car per season for the year 1924.

The upper curves in the accompanying chart were plotted from these records. The average kilowatt-hours per car per day based on the average atmospheric temperature are shown. The cars upon which these records were taken had a total heater capacity of 13 kw., which



Energy consumption to heat city car electrically for various atmospheric temperatures and thermostat settings. The 60-deg. thermostat curve is from tests; 50 and 40 deg. curves are calculated

accounts for the sharp bend in the curve at 25 deg. atmospheric temperature. In other words, the 60 deg. thermostat would not cut off the heaters at all when the outside temperature was below 25 deg. The two lower curves indicate the calculated energy with thermostat control set to cut off at 40 deg. F. and 50 deg. F., respectively.

The comparative annual costs per car of electric heating and heating obtained from dynamic braking and

starting rheostat losses is shown in Table IV. These costs will depend on average winter temperature, which in the latitude of Joliet is about 33 deg. The estimated saving of \$300 per car per year with dynamic braking is conservative, as it includes only the energy cost. This method of braking during winter will also effect savings in brakeshoe wear and cost of collision accidents.

TABLE III—COST OF ELECTRIC HEATING ON CITY-TYPE DOUBLE-TRUCK CAR WITH 60 DEG. THERMOSTAT CONTROL

Month	Kilowatt-Hours				Average Car-Miles per Day	
	Per Total	Car-Mile Motor	Heating per Day	Total Heat*		
January, 1924.....	3.46	2.31	1.15	207	6,417	180
February.....	3.43	2.23	1.20	216	6,048	180
March.....	3.25	2.20	1.05	189	5,859	180
April.....	2.54	2.24	0.30	54	1,620	180
November.....	2.66	2.20	0.46	83	2,490	180
December.....	3.39	2.30	1.09	196	6,076	180
					28,510	
Average kilowatt-hours per car per day based on 150-day season... 190 kw.-hr.						

Average kilowatt-hours per car per day based on 150-day season.... 190 kw.-hr.

*Total heat is kilowatt-hours per car per season.

The electric heating energy cost has been based on the average charge per kilowatt-hour. As the maximum demand for heat invariably occurs during the peak, the cost of energy used for heating is higher because of the increased peak demand. Furthermore, the capacity of railway substation equipment must be sufficient to provide for this demand. If the average heater load per car

TABLE IV—COMPARATIVE ANNUAL OPERATING COSTS PER CAR PER YEAR FOR HEATING

ELECTRIC HEATING	
Energy cost, 28,510 kw.-hr. at 1.6 cents.....	\$456
Interest and depreciation, 12 per cent.....	30
Maintenance.....	5
Cost of hauling 250 lb. at 4 cents.....	10
Total cost per car per year.....	\$501
DYNAMIC BRAKING AND HEATING	
Interest and depreciation at 12 per cent.....	\$106
Maintenance and inspection.....	25
Auxiliary heat power, 3,000 kw.-hr. at 1.6 cents.....	48
Hauling 525 lb. at 4 cents.....	21
Total cost per car per year.....	\$200
Estimated saving per car per year.....	\$301

is 12 kw. and substation equipment is valued at \$60 per kilowatt, then the total electric heater investment would be increased by \$720 per car. At 12 per cent interest and depreciation, the operating cost of electric heaters would be increased \$86 per year. The total estimated saving through dynamic heating and braking may therefore be taken at approximately \$400 per car per year.

Educational Opportunities in Los Angeles

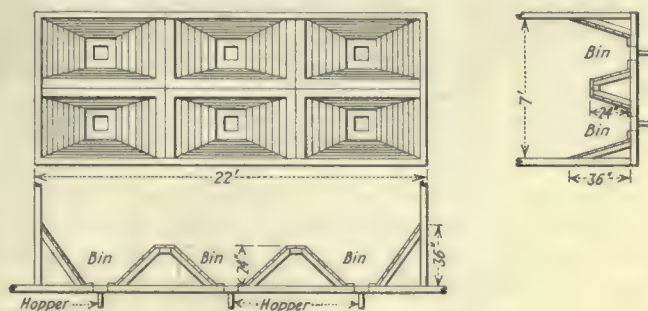
TWENTY-THREE years after the opening of the first courses in engineering at the University of Southern California, Los Angeles, Cal., a college of engineering has been created at that institution. The demand for engineering education in this section of the southwest and the need of industries in southern California for centralized and adequately-equipped engineering laboratories has led the board of trustees of the university to authorize this college. Philip S. Biegler, professor of electrical engineering at the university for the past five years, has been appointed acting dean by President Rufus B. von Klein Smid. From 1918 to 1921 he served as associate engineering editor of *Electrical World*, a McGraw-Hill paper.

This new college, which will open its doors in September, will be made up of five major divisions with separate chairmen. The divisions comprise chemical engineering; civil engineering; electrical engineering; mechanical engineering and petroleum engineering. In addition to the four-year courses leading to degrees of bachelor of science in any of the divisions of engineering, and master's degrees for graduate work, there has been established the degree of civil engineer for distinction in the practice of engineering.

Sand Car with Six Hopper Outlets

RAIL sanding equipment has received considerable attention the past year on the New York & Queens County Railway, Woodside, N. Y. Simplification of the rail sanding methods and continuity of sand flow have been considered of such importance that a special sanding equipment was designed and constructed in the shop. A second-hand single-truck passenger car was purchased and stripped of all internal fittings. All glass was removed and the windows boarded with $\frac{1}{2}$ -in. x 6-in. material from the sill to the letterboard. Necessary changes were made on the end and window posts to obtain a neat appearing and weatherproof job. Suitable solid sliding windows were left in the sheathing to permit of filling the car with sand.

Six sand bins approximately $3\frac{1}{2}$ ft. wide by 7 ft. long by 2 ft. high were erected from 2-in. x 4-in. timbers and the sides were tapered to afford a minimum of fric-



Bin arrangement in sand car

tion to the sand flowing by gravity to the hopper located in the bottom of each. These frames were covered with $1\frac{1}{4}$ -in. spruce which was ship-lapped $1\frac{1}{4}$ in. on each end to minimize leakage. All were painted with two coats of heavy metallic red paint. The capacity of each bin is approximately 1.5 cu.yd. of dry sand.

The bins are equipped with Brill dump-it type sand hoppers and have spouts in front of and between the wheels directly over each rail. Three operating levers are installed on the front and rear platforms. Two of these levers control the sand flow in front of the leading wheels and the other controls one in the center. They are held in a latched position by a notched circle plate, thus permitting any desired degree of sand flow. The operating levers normally are held in the off position by a heavy coil spring attached to the lower extremity of the lever. This multiplicity of sanding outlets has eliminated the constant shoveling of sand into the hoppers, decreased the possibility of failure and permits the operator to see the results obtained by the sanding equipment.

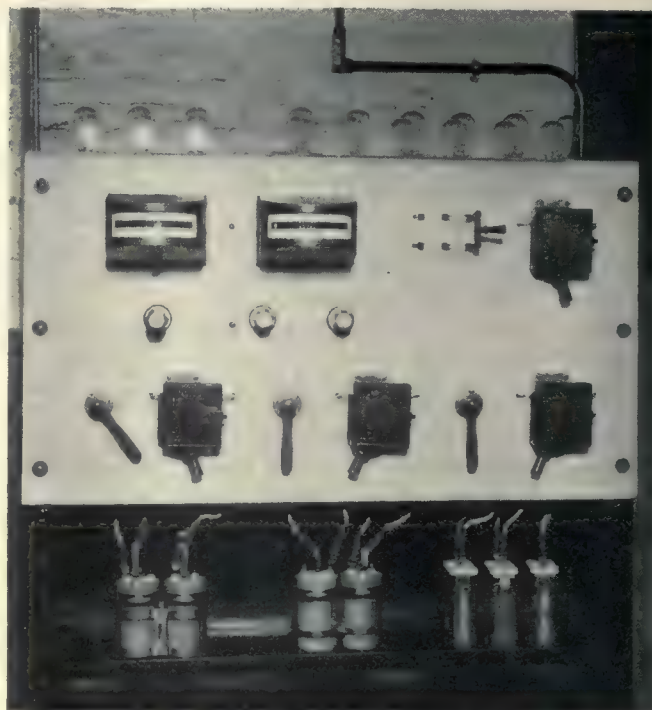
Lightning Arrester Testing Set

BY JEFF RUCK

Engineer Rolling Stock and Shops Department, New Orleans Public Service, Inc., New Orleans, La.

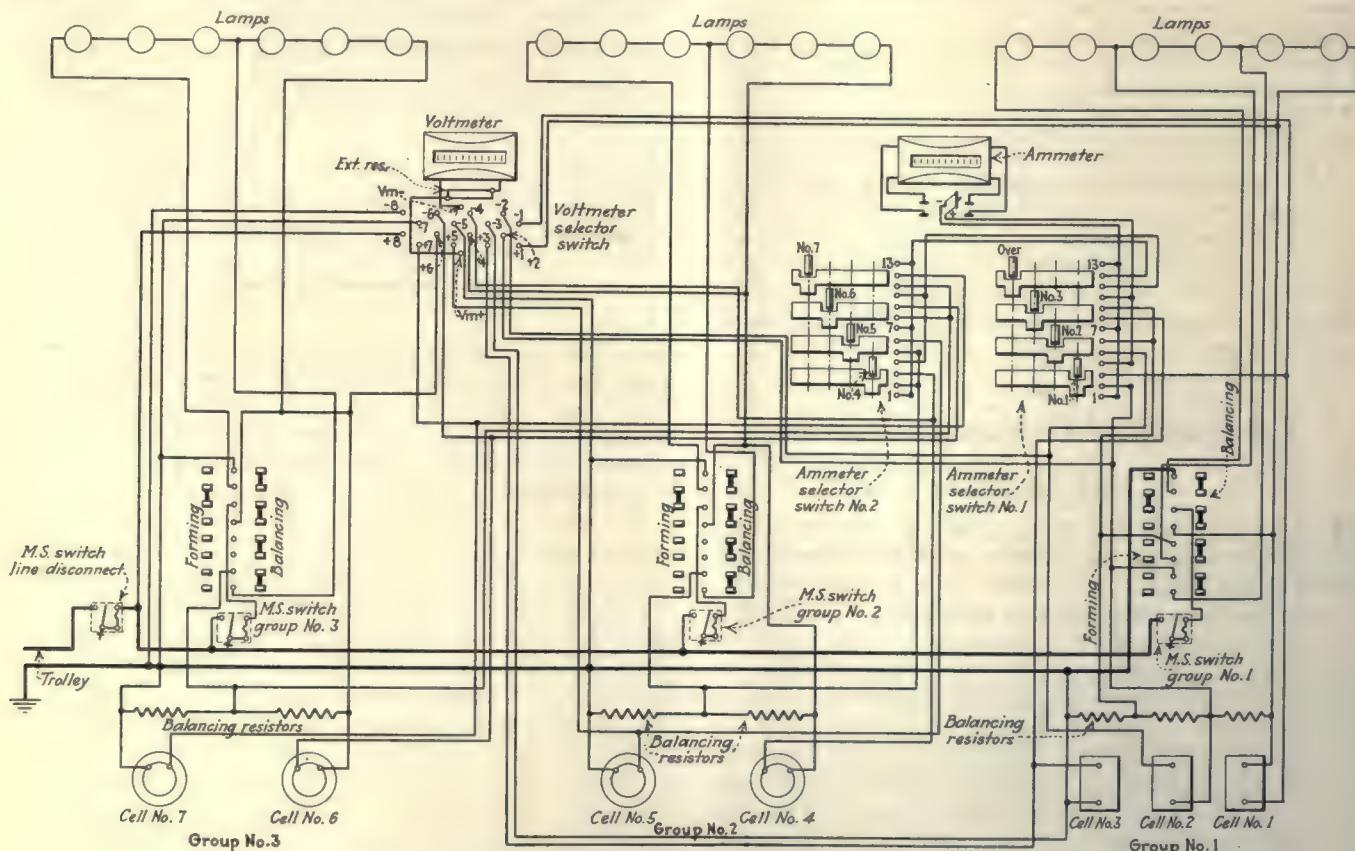
CHARGING and balancing lightning arrester cells of the electrolytic type, as used by the New Orleans Public Service, Inc., is done with a testing set whose general layout and connections are shown in accompanying illustrations. Three groups of cells may be handled at one time. In the halftone shown the Westinghouse two-cell type is on the left, the General Electric two-cell type in the center, and the General Electric three-cell type on the right. Each group is controlled by the switch directly above it. The entire set may be disconnected from the power supply by the switch at the upper right corner of the switchboard.

When preparing a cell for service, a protecting film must be formed on the plates. To do this the reverse handle is moved to the left, thereby placing the six lamps in series with the cells. After from ten to twenty seconds the reverse handle may be moved to the right, placing the cells in parallel with the lamps and balancing coils. The condition of balance of the cells may now be determined by using the voltmeter and taking a reading across each cell. The true voltage is secured by multiplying the readings by four. Usually the cells are not balanced with respect to each other, and the balancing current may be left on until the voltage across each cell is very nearly the same, which may require two or three hours. The current flowing through the cells may be checked by the double-scale ammeter which has a range of 1.0 amp. on the upper scale and 50 milliamperes on the lower scale. The double-pole, double-throw switch is used for selecting the proper scale. The two ammeter selector switches are used for sending charging



General view of lightning arrester testing set

or balancing currents through the ammeter. The need for balancing of the voltage drop across cells before placing them in service becomes greater with the use of the General Electric three-cell type arrester, which is used without balancing coils. However, all guesswork has been eliminated in connection with the two-cell type of arrester as well, since it is possible to send out arresters from the overhauling shops which are known to be in first class condition.



Wiring diagram for lightning arrester testing set of the New Orleans Public Service, Inc.

Truck Overhauling Systematized

in Brooklyn

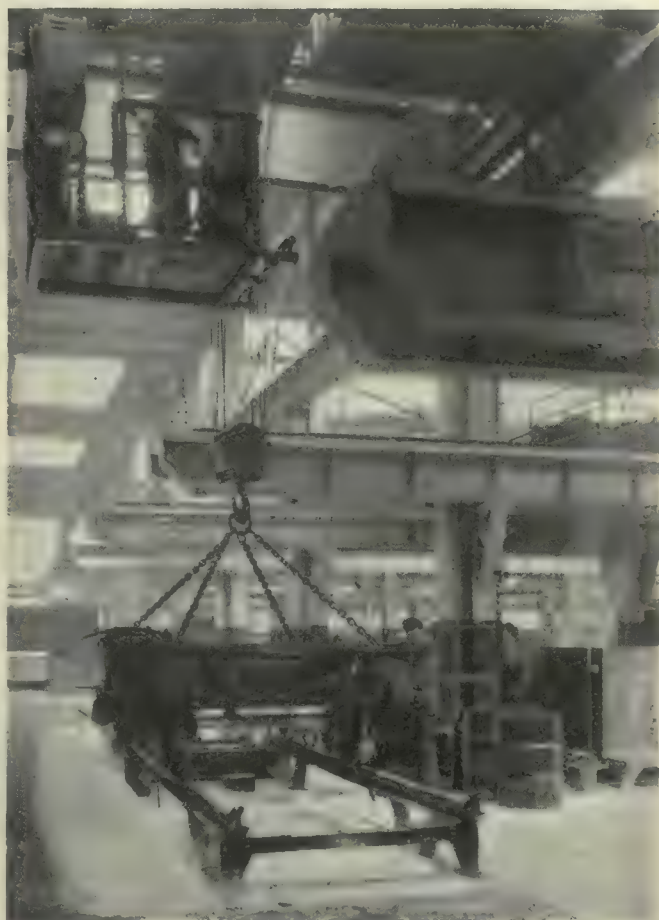
In the Coney Island shops of the Brooklyn-Manhattan Transit Lines car trucks are brought in on a dismantling track and go out on assembling tracks. Between and perpendicular to these tracks are eight bays used for inspection and repair work

By Clarence W. Squier

Associate Editor *Electric Railway Journal*

CONTINUOUS flow of the work along definite paths is an outstanding feature of the truck overhauling plan carried out in the Coney Island shops of the Brooklyn-Manhattan Transit Lines. The large volume of work handled permits specialization of the various subdivisions to a degree not found in many electric railway shops. Flexibility, so important in this class of work, results directly from the "spot" system used, in which truck frames are placed on stands in definite positions for various jobs, such as stripping, repairing and building up.

Some 20,000 sq. ft. of floor space in the central part of the large main repair shop is devoted to truck overhauling. On the west side of this section the trucks are brought in on one track and dismantled, and on the east side the trucks are assembled and returned to the car bodies on two similar tracks. The space between is divided into eight bays devoted to the detailed inspection and repair of the various parts after they are dismantled. Seven of these have 5-ton overhead traveling cranes controlled from the floor. A 15-ton overhead traveling crane

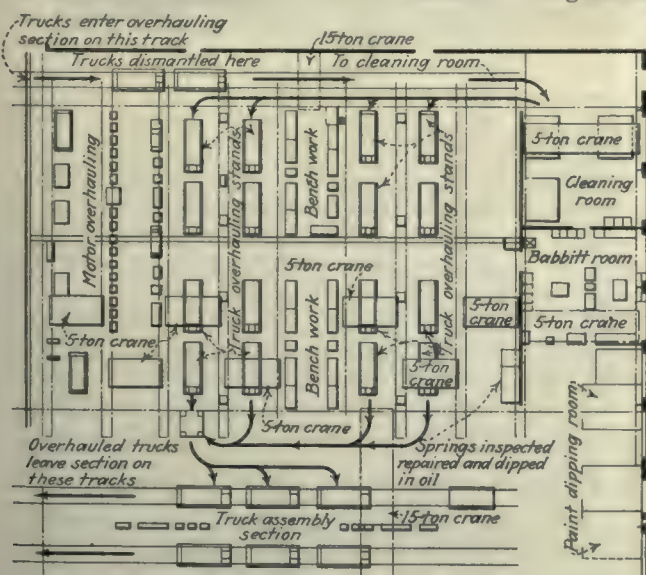


Dropping out wheels and journal boxes while the truck frame is lifted and carried by overhead crane to the cleaning room

serves the dismantling track and another traveling crane of the same size serves the two assembly tracks.

Trucks are brought into this section of the shop for overhauling every two years. Intermediate and running repairs are made in another section. During the intervening two-year period it frequently happens that trucks are changed, so that when the car comes in for its next overhauling it may have different trucks from those with which it went out originally. In that event the trucks which are under the car when it comes in for repairs are sent to the intermediate truck repair section, and those which were under the car when it went out originally are removed from other cars in the intermediate truck repair section and are sent to the truck overhauling section for the regular scheduled inspection and repair. The procedure insures that trucks are overhauled on their regular schedule and gives increased flexibility to intermediate repair work.

When cars are brought into the repair shop they come in on the track on the west side, which extends into the truck overhauling section. After the car body is lifted off, the trucks are pushed by storage-battery tractors into position on the dismantling track in the truck section. Provision has been made for future installation of control equipment so that trucks can be run under their own power into and out of this section. The proposed equip-

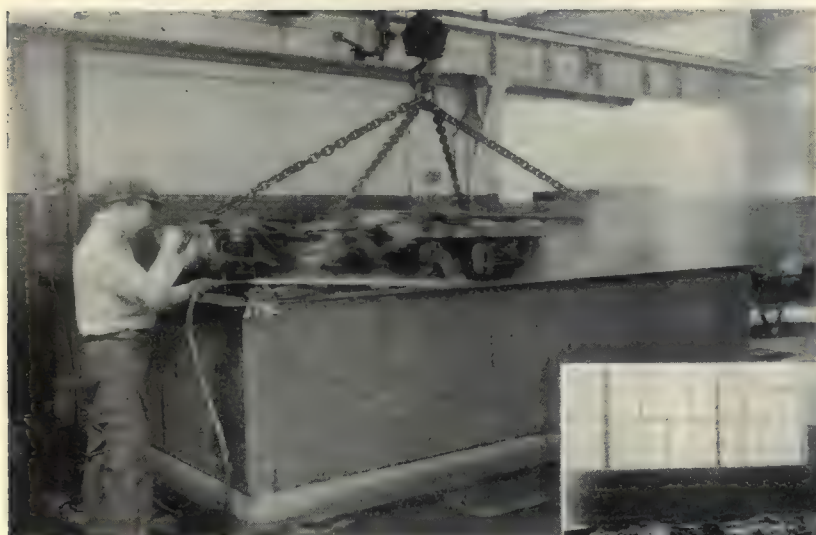


Truck overhauling section in Coney Island shops of Brooklyn-Manhattan Transit Lines



bolsters, journal boxes, bottom brake rods, miscellaneous hangers and brake rigging parts, spring planks, radius bars and elliptic springs are placed on large trays with legs to raise them off the floor so that an elevating truck platform can be run underneath for raising and transporting this material to the cleaning room. A clamp is placed over one end of each complete elliptic spring so that the various sections comprising it are held together. Small parts such as bolts, nuts, etc., are put in pails and are carried to the cleaning room by the electric trucks.

The cleaning room at present has three tanks, each 10x14 ft., with its top 3 ft. above the floor level. Two of the tanks have a chemical cleaning solution, steam heated to the desired temperature. The third tank is for rinsing. Truck frames and parts to be cleaned are lowered into the cleaning solution by a 15-ton floor-operated overhead traveling crane which serves the cleaning room. With the present cleaning solution, when the truck and parts come out, after remaining in the tank for three hours, they are about 75 per cent clean. They then are placed over the washing tank and water is sprayed on them with



At top—Placing a truck frame in the chemical cleaning tank.

Center, left—Washing a truck frame after it has been removed from the chemical cleaning tank.

Center, right—Cleaning a frame with a wire brush.

At bottom—A truck frame and stand containing journal boxes after they have been removed from the cleaning tank.

ment consists of contactors and resistors controlled from push-button stations alongside the tracks. A single lead will supply power to the truck to be moved.

STRIPPING OF TRUCKS IS DONE RAPIDLY

As soon as the truck is run in, all large parts are loosened and the 15-ton traveling crane over the incoming track is used to lift off removable parts, such as the motor, gearcase, bolster, elliptic springs, spring plank, radius bar and shoe beams. Motors enter the motor overhauling section immediately adjacent to the track on which the trucks are stripped. The journal boxes, with wheels and axles, are left on the track as the truck frame is lifted and carried to the cleaning room by the crane, after which they are moved to the wheel and axle shop. Waste and oil are removed from the journal boxes and are placed in large drums, which when filled are transported by electric tractors to the waste and oil reclaiming department.

The larger parts removed from the truck, such as

a hose, the nozzle of which has a metal scraper at the end so that accumulations of grease and dirt can be loosened readily.

After this cleaning, the trucks and parts are returned to the section between the incoming and outgoing tracks and are placed on assembling stands which raise the truck frame up to a convenient height for the workmen. The general type of truck overhauling stand used in the B.-M.T. shops was described in *ELECTRIC RAILWAY JOURNAL* for May 19, 1923, page 853. Those used in the Coney Island shops have locked chests for tools extending across one end. The workman has one key and the foreman a duplicate.

TESTING FOR DEFECTS IS DONE THOROUGHLY

In the overhauling bay, truck frames are cleaned with a wire brush. An inspector goes over them carefully to discover cracked parts, loose rivets and worn parts which are to be replaced. He indicates any changes in construction that are to be made. The practice of the com-



At left—Cutting off heads of rivets to loosen parts that require replacement. At right—Truck frames with parts marked in chalk for replacement and rivet heads cut off so as to loosen parts that are to be removed

pany is not only to put the trucks in as good condition as they were when new, but to incorporate any improvements in material or design that are available. Some of the changes that are now being made during overhauling are the installation of manganese wear plates on journal boxes and pedestals, installation of new end frames, new spring plates and Potter end castings on elliptic springs. The inspector chalks with X marks the parts which are to be taken out and replaced. Parts which in general are being replaced, but which will not be changed on a particular truck are marked O.K. with chalk. For instance, the installation of manganese wear plates has been going on for some time. On some of the trucks that come in the replacement already has been made. The inspector tests the plates with a magnetized iron bar, as manganese steel is non-magnetic, to determine whether the plates are to be replaced or not. He detects cracks in gusset castings which it would be impossible to see without the thorough cleaning to which the trucks are subjected. All defective material is indicated for removal.

After the inspection all rivet heads are burned off with an oxy-acetylene cutting torch if the rivets need replacing or if it is necessary to loosen parts that must be removed. Where cracks in large parts are found, these are burned out to determine their depth and to see if a satisfactory weld can be made. After the heads are cut off, the rivets are driven out with an air punch.



Dismantling brake rigging at a bench

Following removal of defective parts or those which are to be replaced, the new material is installed. New parts are held with rivets if this was called for originally. For this purpose there are several rivet-heating furnaces which can be moved alongside the work for the convenience of workmen. In assembling, all joints are coated with red lead. After the new parts have been attached, the truck is placed over a test jig to make certain that the pedestal jaws line up and have proper clearance. The present practice is to have the jaws $\frac{1}{8}$ in. wider apart than the journal boxes.

INDIVIDUAL PARTS ARE BROUGHT BACK TO STANDARD DIMENSIONS

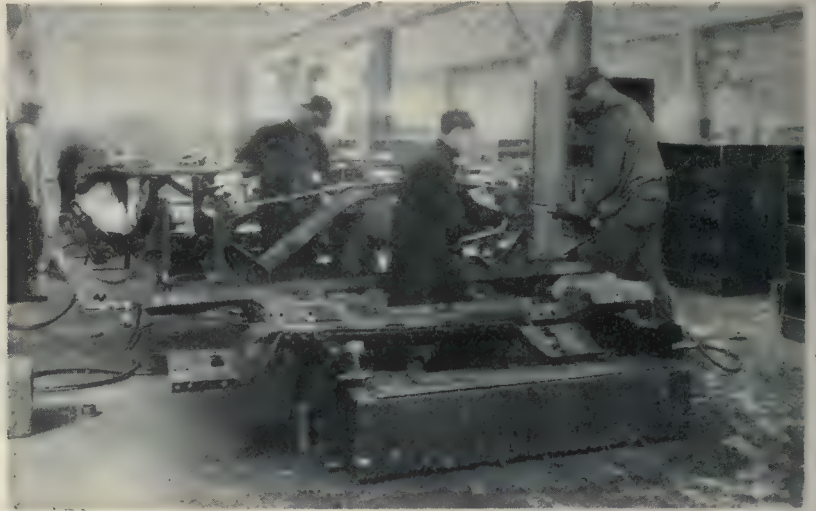
All of the material removed from the trucks goes to adjacent benches or departments for dismantling and individual repairs. Brake rigging, for instance, is taken to a bench and completely dismantled. Worn holes are filled in by electric welding and are redrilled. Worn surfaces are also built up and finished to size. This includes such parts as live and dead leaders, motor nose suspensions and shoe-head hangers.

Journal boxes are taken to the blacksmith shop after they come out of the cleaning tank. The old liners for the pedestal ways are removed and the boxes made ready for installation of new ones. From the blacksmith shop they go to the machine shop and are assembled ready for installation in the truck. New torsion springs are installed for the journal box lids. As these require a little more clearance than the springs previously used, a recess has to be cut with the oxy-acetylene torch. The old wear pieces are taken off journal bearings, which then go to the babbitt room, where they are rebabbitted. A new wear piece is then installed and they finally are finished to proper dimensions.

One section of the shop is devoted to inspection and repair of springs. The truck elliptic springs have six sections. After being cleaned with a wire brush, each is inspected carefully for broken leaves. After defective parts have been replaced, the assembled springs are dipped in an oil bath and placed on a rack to drain. Motor nose suspension springs go through the same process.

ASSEMBLING IS DONE ON STANDS

After everything except the larger parts has been assembled, the truck frames are brought to the truck assembly track and have the journal boxes, wheels and axles placed under them. They then rest on elevated



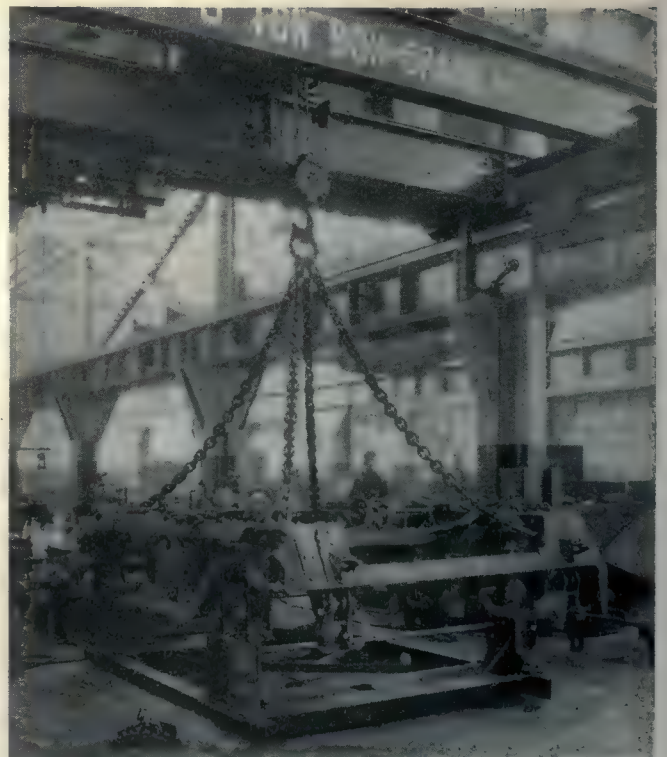
At left—Heating rivets in a portable fuel oil forge alongside the work
At right—Riveting new manganese wear plates to truck pedestals

stands while the remaining work is going on. Repair bolsters, elliptic springs, spring planks, radius bars, etc., are installed, and motors with gearcases, axle caps, etc., are put in place. The truck frames are sprayed with one coat of black paint before the assembling commences and with another coat after it is completed. The work goes on before the first coat is dry. Dipping tanks and draining racks will be installed later, so that trucks can be dipped in paint at the beginning and end of the assembling instead of paint being sprayed on.

After final adjustments have been made, the trucks are run back to the car repair shop for placing under the car bodies. High-voltage tests and running tests are given the equipment after it is installed in the cars.

The present schedule requires that nine cars be completed each 5½-day week, which means that eighteen trucks must be overhauled in the same time, or a maximum of four per day. More than four trucks at a time are being handled, since otherwise one set of workmen might interfere with another. In the overhauling bays are a large number of repair stands on which rest trucks in various stages of repair. The man doing a particular job moves from one truck to the next and completes his work, and then another follows along. This makes the system very flexible and enables the work to be done with surprisingly few workmen. One man is sufficient to do most of the jobs. Of course this could not be done were it not for the ample facilities in labor-saving equipment in the shop.

When the truck comes into the overhauling section, one man dismantles the large parts with the aid of a man in the overhead crane. There is but one man in the cleaning room. The dismantling of brake-rigging parts, such as live and dead levers, motor nose suspensions, and shoe-head hangers, is done by one man, who also carries the parts to the benches. There another man dismantles the various parts and does the bench work. The wire-brush cleaning is done by one man, and one inspector locates defects and looks after parts to be replaced. He tests all rivets with a hammer, and marks any blowholes which



At top—Jig for testing trueness of pedestal guides on truck frames
At bottom—Placing a truck frame on the testing jig



At top—Truck assembly section—bolsters, springs, motors, shoe beams, etc., are placed on trucks here

At bottom—Pushing an overhauled truck by means of an electric tractor out of the overhauling section for placing under car body



Dipping tanks and draining racks for springs

The tank at the left contains oil in which the springs are dipped. A quantity of motor suspension springs are shown in piles on the draining basin; at the extreme end of the rack are three elliptical springs.



Free stores are located immediately adjacent to the truck overhauling section. Small parts are kept in bins and larger parts in racks

might be dangerous and require filling up. One man with a blow torch loosens all defective parts, while a machinist with one helper puts on the new ones. A crew of three men do the riveting. One heats the rivets, one operates the air riveter, and the other holds on. Where a rivet hole is too large, or oblong, a welder fills it up and then it is redrilled with an air drill. One man puts on small parts, such as brake-rigging springs. A total of four men do the bench work and inspect various detail parts. On the general assembling track where four trucks are being worked on at the same time, only four men with two helpers are needed.

In the layout of shop equipment and facilities particular attention has been given to prevent unnecessary movement of the workmen in obtaining material for the repairs, in handling it to the job and in the use of any hand tools needed for the work. The material and spare parts for truck repairs are kept on racks and in steel bins and cabinets alongside the work. No order forms or requisitions are used for obtaining parts from these free stores. Most of the parts are of such a nature that there is no temptation toward theft and parts that are of brass or copper are kept in locked cabinets.

Small parts such as bolts, nuts, rivets, etc., are kept in steel cabinets with bins of convenient size. The practice is to replenish material from the general storeroom or from departmental stores at frequent intervals and about one week's supply is kept on hand in the truck overhauling section. This method also provides a convenient check of the material on hand or which may be needed in the immediate future. It also insures that the material is at the spot ready for use as required.

Portable hand and air tools such as riveters, punches, drills, chisels, etc., are issued to workmen on a check system. Each workman has a tool box right at his job to hold his tools, and he can lock it to make sure that the tools are always in place when they are needed. Duplicate keys to all lockers are in charge of the general foreman of the section.

The section is also provided with waste bins and receptacles for parts which are to be moved to other sections of the shop for reclaiming or repairs. All bins and receptacles are of such a form that they can be picked up quickly by an elevating platform truck and moved swiftly and without confusion. The section is also equipped with several inclosed urinals but near the work so no time is lost and workmen have no excuse for leaving the section when work is in progress. All these facilities help to speed up work and insure that highest efficiency is maintained.

Oil House for Denver Tramway

By H. L. MINISTER
Denver, Col.

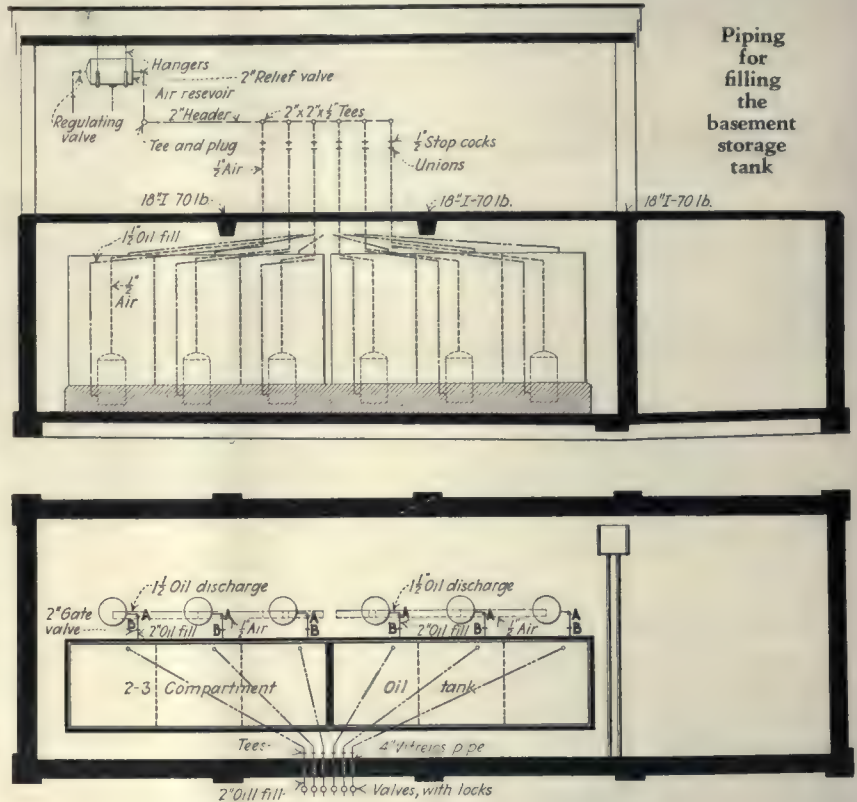
IN THE DESIGN of a new oil house for the Denver Tramway attention was given to future as well as to present needs. The location was an old river or lake bed; therefore precautions were needed to prevent entrance of water. This also made the excavation difficult and increased the cost. In digging for the foundation a good grade of sand was encountered, a portion of which was used in the concrete for the building. This sandy soil and gravel bed necessitated the use of sheet-piling and also required the handling of more dirt, both in excavating and in backfilling.

On completion of the excavation a heavy reinforced-concrete mat used to insure a firm foundation and avoid settling on account of shifting of the sandy soil was first put in. Next the reinforcement for the concrete walls and pilasters was inserted and they were poured. This reinforcement consisted of old steel rails and wire mesh. Allowance was made for ties and bonds between sub-floors or mat and the main floor, sump, walls and concrete tank foundations. Approximately $\frac{1}{2}$ in. of bituminous cement was poured between the finished floor and the mat and in the various ties. To make the basement watertight the outside wall was painted with a heavy coat of bituminous cement. This was necessary, as during high water the water level would be above the basement floor.

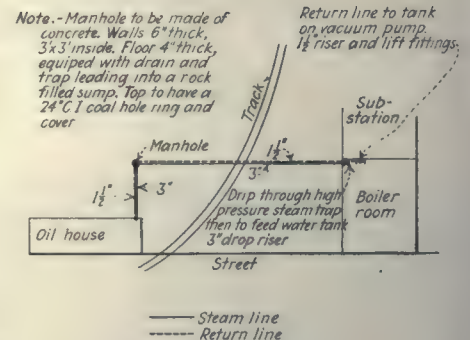
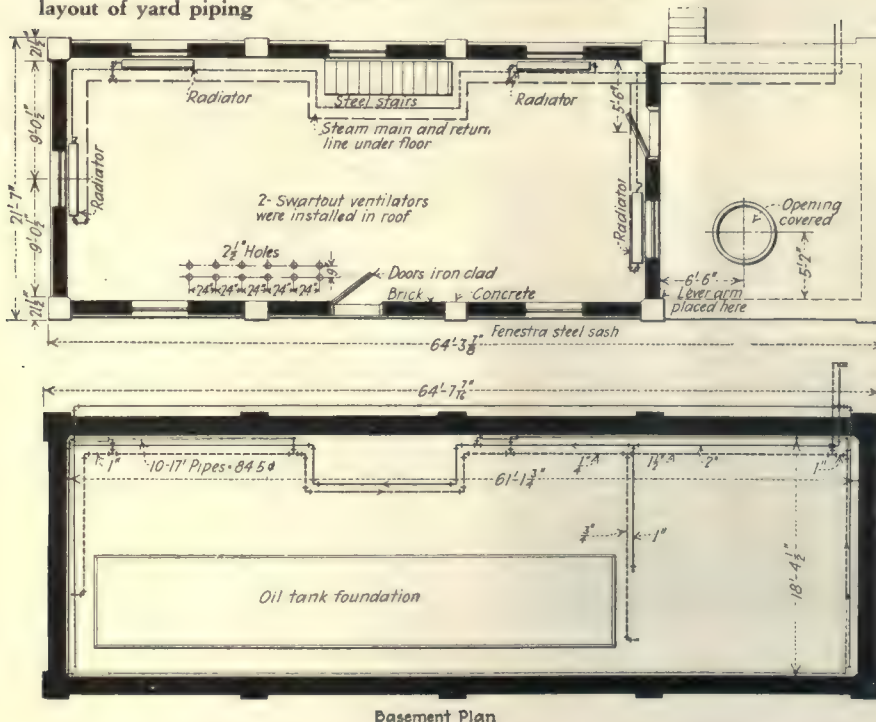
A car repair shop, an inspection shop, a paint shop and a power house are con-

venient to the oil house, so that air and steam were supplied from the compressors and boilers in the shop. The oil house is fireproof. For protection of its contents there is a high-pressure steam line laid in half-section porous tile connecting perforated lengths of pipe and running along the ceiling of the basement. The oil tanks are located in the basement. The main steam valve of this line is on the outside of the building.

In equipping the oil house an oil-reclaiming waste vat, filter tank, waste-saturating tank and dirty oil waste cans were placed on the first floor. Separate oil-air

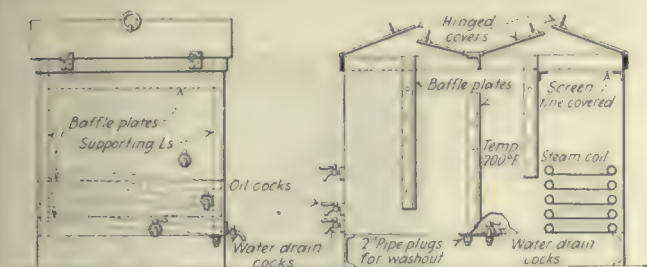


Plan of the oil house. The upper view shows the ground floor and the lower one the basement. At the right is the layout of yard piping



pumps with automatic governing devices were originally called for but later were replaced with an air tank, as shown in the accompanying illustration. Oil runs by gravity from tank cars to the two large three-compartment oil tanks in the basement. Likewise oil flows by gravity from these compartments to the small individual tanks.

The oil house is arranged so that one man can take care of it. Lighting fixtures and wiring are vapor proof.



Settling and filtering tanks

The oil house is covered with magnesite stucco both inside and outside, the inside finishing coat being made with white portland cement.

Water is brought to the oil house from the boiler house and shops. The steam line was laid in half-section vitreous pipe and covered with Johns-Manville pipe-covering material. A swinging lever arm placed in the outside wall over the open platform has a block and fall to raise and lower material from and to the basement. This platform is at car height.

Block for Running in Bus Engines

By F. J. FOOTE

Superintendent of Motive Power and Equipment, Dayton & Columbus Transportation Company, Springfield, Ohio

FOLLOWING an overhaul, the bus engines of the Dayton & Columbus Transportation Company, Springfield, Ohio, have the bearings, piston rings and cylinder walls smoothed up by giving the engine a running test while being driven by a motor. The base of the test block is made up of structural shapes so that an engine can be placed in position quickly. A retired railway motor is used to drive the engine. The original field has been replaced by a shunt winding.

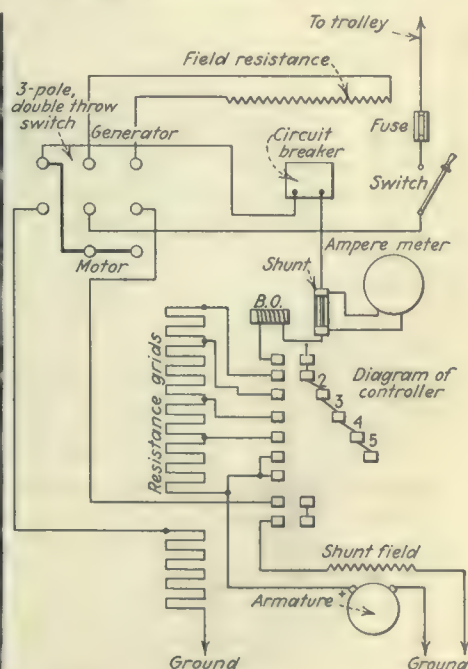
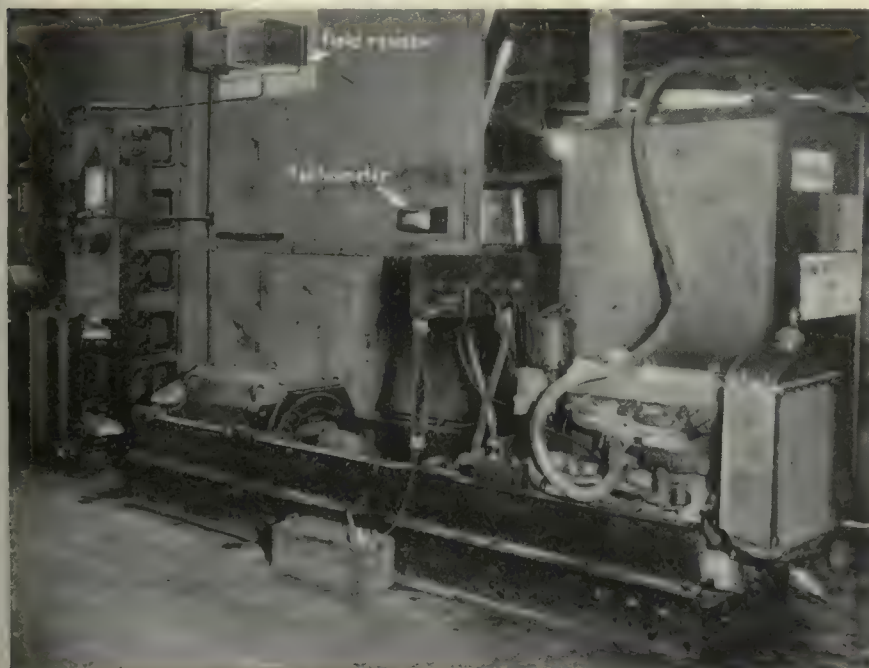
The control equipment includes a modified K-10 controller, resistors for the armature circuit which are

standard car equipment grids, field resistors made of headlight resistance, an ammeter from a substation switchboard, a circuit breaker retired from a car, together with necessary switches and fuses. The accompanying diagram shows the connections. All overhauled bus engines are put on this block and are driven at a speed of about 500 r.p.m. till bearing surfaces are smoothed up. This is indicated by the gradual lowering of the running temperature. It requires from five to eight hours. After this test the gasoline and exhaust connections are made, and the engine is started by means of the motor. The three-pole, double-throw switch shown in the diagram is then thrown over, so that the motor acts as a generator and furnishes the load for running the engine under its own power. The engine is operated for some four to six hours, driving the generator, whose load can be regulated with the controller.

Practically all the parts used were discarded material picked up at the railway company's shop. Data covering resistances, field winding, etc., are not included, as these depend on the size and type of motor used. A motor smaller than 50 hp. should not be employed.

An examination of the diagram shows that, as a motor, the machine operates with the field connected directly from trolley to ground without resistance, and with the lower section of armature resistors cut out. As a generator, it operates with a resistance in the field circuit to hold down the generated voltage, and both upper and lower sections of the armature resistors are in circuit to hold down the load. The armature is then entirely disconnected from the trolley. The reverse drum of the controller is not used, and not all of the main contacts.

A magneto mounted on the motor frame and belted to the armature shaft is connected to an a.c. voltmeter and calibrated to read r.p.m. of the motor armature. This equipment has enabled us to put bus engines in dependable condition. We feel that the wearing in of bearings, rings and cylinder walls without using fuel, and therefore holding down the temperature at the most critical period is of particular advantage.



Test block for running in bus engines and diagram of connections for the various equipment used

The three-pole, double-throw switch should be down when the machine is run as a motor and up as a generator. The resistance shown at the top is in series with the field when the machine is used as a generator.

J. A. McCartney

Wins Maintenance Prize for March

**Mounting for shovel truck receives award.
Charles Herms given honorable mention
for method of broaching brush-holders**

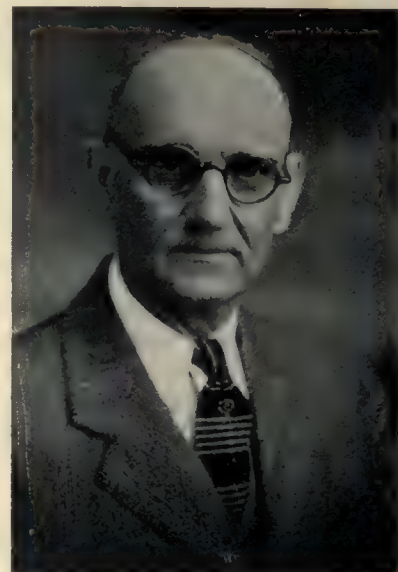
CONVENIENT mounting for an electric shovel truck somewhat simpler and less expensive than the usual caterpillar type, which was described by J. A. McCartney, superintendent of construction, Pittsburgh Railways, Pittsburgh, Pa., was awarded the \$25 monthly prize for March. The novel feature of the device consisted of a pair of axles with ends extended so that they rest outside of the excavated portion between tracks.

Honorable mention for March was awarded to Charles Herms, general foreman San Diego Electric Company, San Diego, Cal., for the description of his method of broaching worn brush-holders. Wear of brush-holders from the

carbon brushes cannot be prevented, but the method described by Mr. Herms gives maximum life from these parts.

J. A. McCartney

who won the monthly prize for March in *ELECTRIC RAILWAY JOURNAL*'s Maintenance Contest, is superintendent of construction for the Pittsburgh Railways, Pittsburgh, Pa. When the railway went into the hands of receivers some years ago, he was chosen to organize a construction division of the way department for the purpose of rehabilitating the tracks, which then were in very bad condition. This organization began to function in 1919 and since that time has been rebuilding approximately 35 miles of track each year. One of the practices inaugurated by Mr. McCartney was that of setting up schedules for starting and finishing dates on each job. This permits municipalities which



are affected by the reconstruction work to arrange their contract letting so that no delay occurs when the flanks of the street are to be rebuilt. It also permits the traffic department to arrange and take care of traffic problems.

The first electric railway experience of Mr. McCartney was with the Second Avenue Passenger Street Railway of Pittsburgh on its engineering corps. When this company was merged with the United Traction Company he continued in the engineering department as transit man and draftsman. Upon the merger of this company with the Philadelphia Company he continued in the engineering department in general engineering practice, power house design, transmission lines, street railway extension, etc. He became supervisor of tracks in 1915.

MAINTENANCE CONTEST Extended Three Months

MAINTENANCE men with knowledge of improved methods or devices which may win a \$25 monthly prize in *ELECTRIC RAILWAY JOURNAL*'s maintenance contest have three more months to send in their ideas. The time limit for submitting items, which previously was set as April 30, has been extended up to and including July 31.

Instead of confining the publication of articles submitted in the contest to the third issue of *ELECTRIC RAILWAY JOURNAL* each month, they will be published in other issues also. The prize winner each month will be selected from the items published that month. This change was found desirable

as some of the articles sent in do not make up readily into the Data Sheet size used for items in the third issue each month. Also, some contestants submitted so many items that not all could be published in time to be considered by the judges for a prize if publication was confined to but one issue each month.

The following are the revised conditions for submitting material in the contest.

1. Any employee of an electric railway or bus subsidiary may compete.
2. The author does not need to be the originator of the idea.
3. Articles may be submitted by several persons or by a department.
4. Any maintenance practice or device for electric railway or bus repairs may be submitted.
5. Articles should be 100 to 200 words

long, with one illustration, and in no event longer than 400 words with two illustrations.

6. Illustration material may be in the form of drawings, sketches, blueprints or photographs. All sheets should be marked "Maintenance Competition."

7. Manuscripts should be mailed to the Editor of *ELECTRIC RAILWAY JOURNAL*, 10th Avenue at 36th Street, New York, N. Y.

8. A prize of \$25 will be awarded each month for the best maintenance idea in the group published during that month. A minimum of \$5 will be paid for each article accepted for publication. Manuscripts will be received until July 31, 1928.

9. Announcement of the winner each month will be made in the issue devoted to maintenance and construction (the third issue each month) following the month in which the article was published.

10. Additional details were given in *ELECTRIC RAILWAY JOURNAL* for April 16, 1927, pages 700-701.

Electric Railway Journal Maintenance Data Sheet

BUSES AND TRUCKS—11

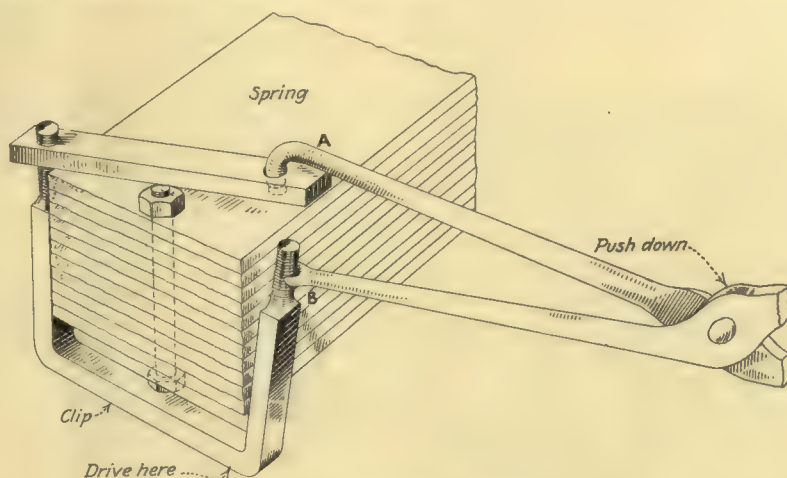
Clip Tongs Aid Bus Spring Installation*

BY FARRELL TIPTON

Electrician San Diego Electric Railway, San Diego, Cal.

IT IS quite difficult to get both legs of the clip for holding laminated springs of buses into the holes of the draw plate, and when driving it over an automobile spring the leg of the clamp is often sprung. Installation of these clips has been made much easier in the shops of the San Diego Electric Railway, San Diego, Cal., by use of a pair of tongs with the handles remodelled to form a special tool for the work.

The tool is constructed by bending the end of one handle down and tapering this so as to fit readily into the hole of the draw plate. The other handle is cut off and drawn nearly to a chisel edge. A slot is cut on this edge so as to keep it from slipping off the bolt when applied. To bring the leg into position by means of the tool, the bent end A is



Special tool for installing bus spring clips

placed in the hole of the draw plate against the clip. By pushing down as shown in the accompanying illustration, and the other end B is placed the projecting end can be inserted.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

TRACK AND WAY DEPARTMENT—24

Valve Regulator for Pneumatically Operated Wire Brush*

BY FRANK J. MARTIN

Superintendent of Maintenance Pittsburgh Railways, Pittsburgh, Pa.

FOR the cleaning of steel work on bridges and other way structures with a pneumatically operated rotary wire brush the Pittsburgh Railways has added a minor attachment in the form of a valve regulator that eliminates a dangerous hazard when the operator is working on high scaffolding.

A $\frac{1}{2}$ x3-in. stove bolt is mounted in the top of the handle of the pneumatic engine so that it limits the amount of air admitted by the trigger valve and can be set as desired. This enables the operator to maintain a strong grip on the handle and trigger of the machine so as to do efficient work with comparative safety. With the full air pressure it was found that the torque exerted



Setscrew in handle of pneumatic engine limits travel of trigger valve as desired

by the rotary brush was sufficient to upset the operator if particular care was not exercised.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

BUSES AND TRUCKS—12

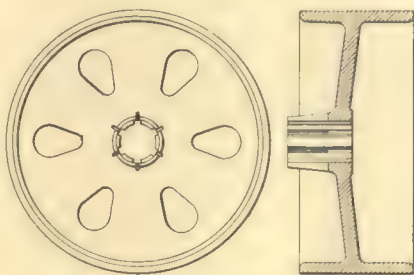
Gun Iron Used for Brake Drums*

BY D. S. MACKAY

Supervisor of Automotive Equipment
Boston Elevated Railway, Boston, Mass.

IN THE early part of 1923 the Boston Elevated Railway faced a problem of having to renew driveshaft brake drums two or three times a year. This was due to their scoring in service, which made it necessary also to replace the brake linings. The maximum service of the brake linings obtained was but 2,200 miles. This increased the maintenance cost for buses.

To overcome these troubles, driveshaft brake drums are now made of gun iron, which is obtained from a local manufacturer. This material develops a smooth and even finish on the braking surface of the drums without apparent signs of wear.



First type of brake drum
using gun iron

Service from brake linings has been increased to approximately 16,000 miles and the life of the drums appears indefinite. This material is now used for all driveshaft drums and several rear wheel brake drums on the heavier type of buses and since its adoption brake drum renewals are practically unknown.

Correction of this trouble has improved brake conditions and resulted in a decided economy in labor and material with a corresponding marked reduction in maintenance cost. The accompanying illustration shows the first type of brake drum where gun iron was used.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

TRACK AND WAY DEPARTMENT—25

Strengthening Wheel Construction for Portable Equipment*

BY WILLIAM BUKER

Master Mechanic, Way Department, Toronto Transportation
Commission, Toronto, Canada

SEVERAL failures of steel wheels on portable air compressors have been experienced by the Toronto Transportation Commission due to running over hard surfaced city streets. These wheels are built with an iron hub into which are fastened cast-steel spokes, these in turn being welded into the steel tires as shown in the first illustration.

To overcome the trouble two worn-out bucket loader disks were dished. After cutting out the center hole to clear the hub flange these were welded to the tire on either side of the wheel, as shown in the accompanying illustration.

Other circles 10 in. in diameter with center hole cut to make a close fit on the hub proper were welded in two parts to both large disks, and the whole was pulled tight with six $\frac{3}{4}$ -in. bolts.



Method of strengthening steel spoke cast-iron hub wheels
on construction equipment

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—TRUCKS—22

Fixture for Boring Journal Bearings in a Lathe*

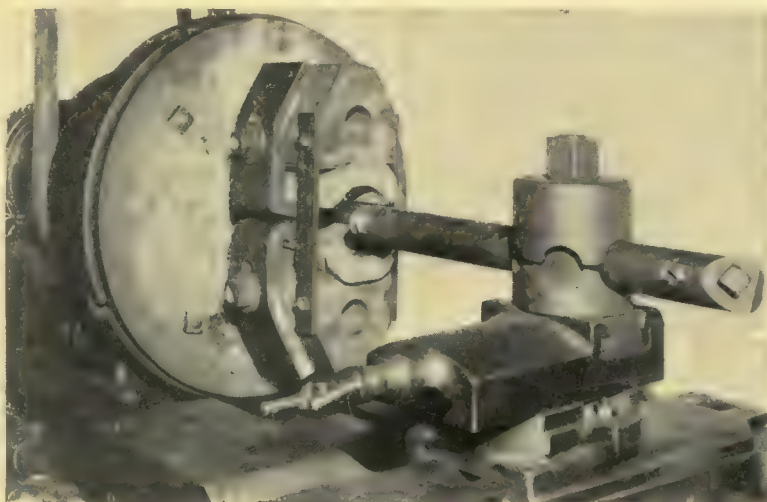
BY FRANK B. CARPENTER

Master Mechanic Charleston Interurban
Railroad, Charleston, W. Va.

LEAD-COPPER bronze is used for journal bearings by the Charleston Interurban Railroad, Charleston, W. Va. The mixture is known as Ex. B metal and consists of 78 per cent copper, 15 per cent lead and 7 per cent tin. Journal bearings are bored to necessary dimensions two at a time, in a lathe, by using the fixture shown in the accompanying illustration. The fixture is made of ordinary gray cast iron and has two projections into which the bearings fit for machining. The outside ends of these projections are braced by means of two bars bolted to the sides.

Four forged and machined jaw clamps are used to hold a pair of bearings in position for boring. These clamps are self-centering, and as the work is drawn down it

is pulled to the center at the same time. The boring is done by attaching a boring bar to the tool post of the lathe. With this fixture three pairs, or six bearings, are machined per hour.



Boring two journal bearings in a special fixture

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—44

Grease Fittings for Lubrication of Ball Bearing Motors*

BY R. T. CHILES

Master Mechanic Cumberland County Power & Light Company, Portland, Me.

WHEN the General Electric type 258-C motors went through the shops of the Cumberland County Power & Light Company for their first general overhauling it was found that the ball bearings with which these armatures were equipped were not receiving proper lubrication. To improve conditions, two grease pipes were applied to the motor, which consist of a $\frac{1}{4}$ -in. pipe with nipple and cap. An Alemite grease compressor is used, which is equipped with a flexible connection and $\frac{1}{4}$ -in. Alemite fitting. When



Standard Alemite grease compressor used for lubricating armature bearings

greasing, the pipe cap on the motor connection is removed and the $\frac{1}{4}$ -in. pipe coupling attached to the Alemite compressor is screwed on. Armature bearings are now lubricated once each month with grease, a summer grade being used in the warm weather and a winter grade during cold weather. With this improved method of lubrication increased armature bearing mileage has resulted. For the year 1926, with 46 motors in active service, the average bearing mileage obtained was 121,851 miles.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Electric Railway Journal Maintenance Data Sheet

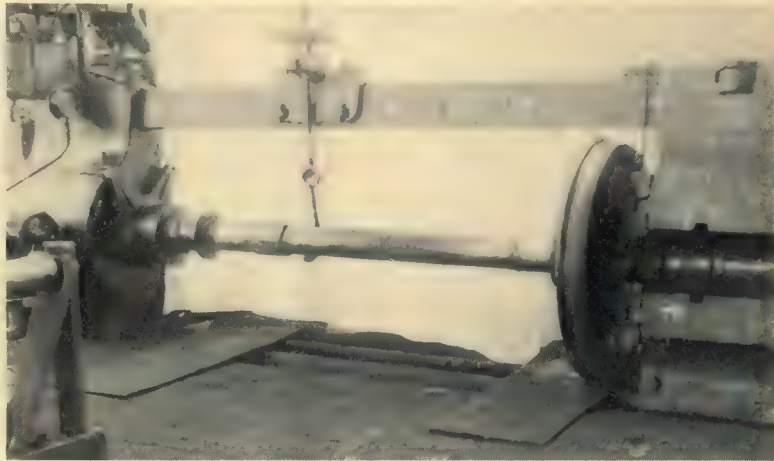
ROLLING STOCK—TRUCKS—23

Split Sleeve Protects End of Shaft While Being Pressed into Wheel*

BY C. B. HALL

Chief Clerk Mechanical Department Virginia Electric & Power Company, Norfolk, Va.

DANGER from bending axles at the journal bearing section while pressing on wheels has been overcome in the Norfolk shops of the Virginia Electric & Power Company by a split steel casting devised by T. W. Madison, master mechanic. The casting is constructed so as to fit over the journal end of the axle and apply pressure to the shoulder of the axle at the inside end of the bearing. The casting is so constructed that a ring keeps the casting in position while under pressure. Previous to the use of this device bent axle journals reached a menacing number.



A split steel casting placed on the end of the axle while pressing on wheels prevents bending

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK ELECTRICAL—45

Air Compressor Armature Stand*

BY ARTHUR E. CLEGG

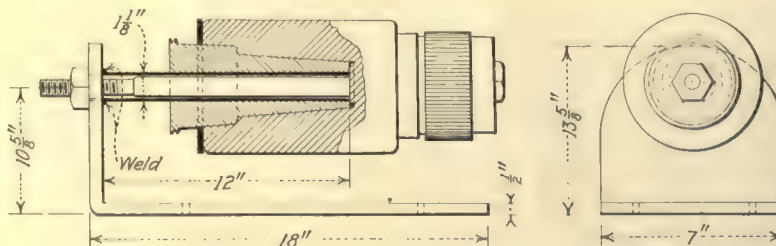
Foreman Electrical Department, San Diego Electric Railway, San Diego, Cal.

SOME types of compressor armatures have an extension of the shaft at the commutator end so short that it cannot be used for support. To support this type of armature while it is being repaired a stand was designed and made in the electrical department of the San Diego Electric Railway. The ac-

companying sketch shows the construction.

The supporting base is made from mild steel 7 in. wide by $\frac{1}{2}$ in. thick. This is bent in the form of an "L" and the end is rounded off. The upright extension is $13\frac{5}{8}$ in. high and the base is 18 in. long. The stand can be bolted to a table which

has castors on the legs if it is desired to have this portable. For supporting the armature a pipe is arranged to slide over the armature shaft. With the type of armature used in San Diego a $1\frac{1}{8}$ -in. inside diameter pipe 12 in. long is used. This is fitted to the end piece and welded.



Stand for air compressor armature used in the electrical department of the San Diego Electric Railway

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

HEAT ALONE IS NOT SUFFICIENT FOR ARMATURE BAKING

It takes more than heat to properly bake an armature or a field coil for electric railway service.

The baking of the dipped coil or armature is probably the most important of the series of operations through which it passes. Under-baking will leave the varnish soft and liable to be thrown off by the centrifugal force of the rotating armature, leaving it unprotected and out of balance. The remaining solvent and thinner in underbaked portions also decrease the dielectric strength and are apt to promote deterioration in both fabric and insulation. Overbaked insulation represents an economic loss in heat consumed beyond that necessary to bring the process to its proper point. But more important still, it also tends to shorten the effective life of the varnish in service.

It is therefore very important in baking to maintain the proper oven temperature and to hold all parts of the oven at the same temperature, to get uniformity of bake throughout. The fumes and gases from the volatile oils driven off by heat must be removed immediately in order to maintain the most effective drying conditions in the oven. Oxygen in sufficient quantity must be available in order to properly oxidize the heavier oils in the varnish compound.

For large armatures with deep windings, the better practice is to begin the bake with a temperature of about 150° F. holding this for about one hour before the maximum temperature is reached. This preliminary low temperature bake allows a thorough volatilization of the lighter oils from the interior of the coils before the oxidization of the outer layers has proceeded far enough to trap them. This precaution is not necessary with the shallower windings.

The volatiles having been driven off, the oven is brought up to full baking temperature and oxidization of the heavier oils is carried on. Full baking temperatures range from 200° to 250° F., the duration of bake from 5 to 48 hours on large magnet and field coils.

To meet successfully the requirements above stated it is essential that baking time, temperature and air conditioning be constantly under close control.

And the control of these factors can only be obtained in an oven that is properly constructed, properly heated and properly ventilated—in short an oven intelligently designed and built for a specific purpose.

In view of the recognized economy of trouble-free motors, it is just good business to use the procedure and equipment which will produce a strong, durable protection for the armature windings.

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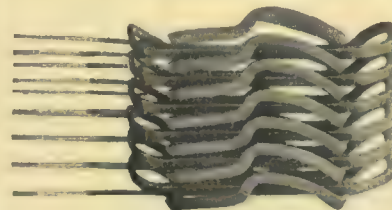
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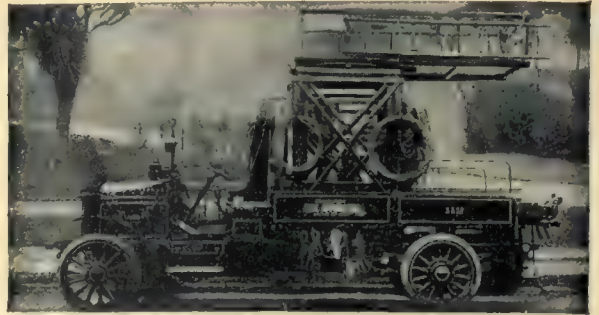
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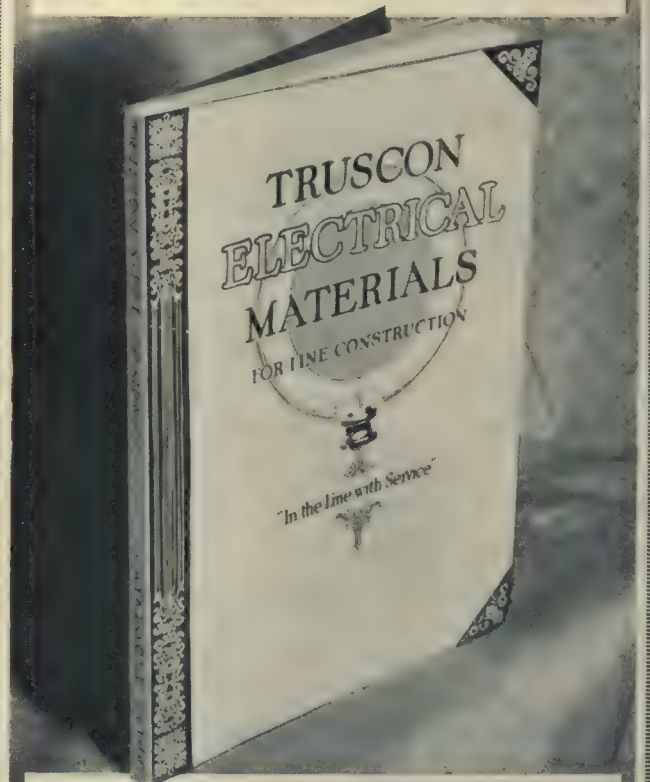
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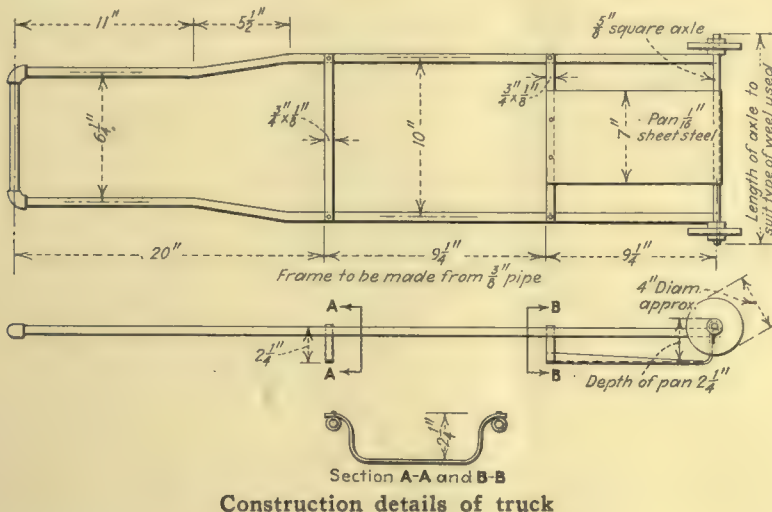
ROLLING STOCK—MISCELLANEOUS—28

Truck for Handling Lift Jacks*

BY A. G. POLLARD

Rolling Stock Department Toronto Transportation Commission, Toronto, Canada

RECENTLY a small hand truck was designed for use in the Hillcrest shops and the car houses of the Toronto Transportation Commission, Toronto, Canada. This truck conveys lift jacks easily and quickly to those places in the shop where they are required.



Construction details of truck



Labor-saving truck for handling jacks

As may be seen in the accompanying illustration, the truck is simple and inexpensive, the framework being ordinary $\frac{3}{8}$ -in. black iron pipe. It is so light it can be pushed with one hand.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

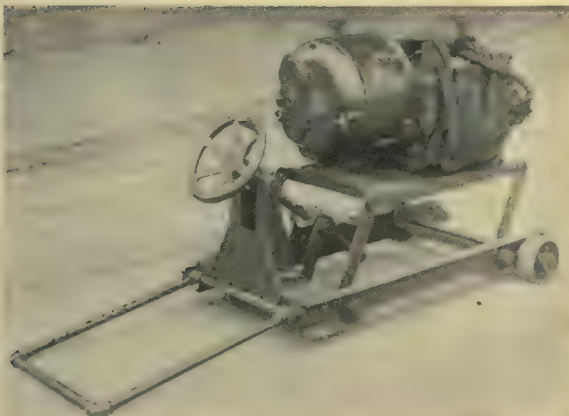
Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—MISCELLANEOUS—30

Elevating Truck for Air Compressors*

BY PAUL UHLICH

Engineer Rolling Stock and Shop Department New Orleans Public Service, Inc., New Orleans, La.



Elevating truck for placing or removing air compressors

HANDLING air compressors efficiently prompted the design of a special truck which was built for the railway overhauling shop of the New Orleans Public Service, Inc. This truck is used for removing or replacing compressors under cars and has resulted in a great saving of labor. An overhead crane serves the aisles between car tracks so that the truck is used to transport compressors but a short distance.

The platform is raised and lowered by swinging on four links fastened to the framework. A screw fitted with a hand wheel at the top and with nuts to give the desired movement is used to raise and lower the platform. When fully lowered the platform is $6\frac{1}{2}$ in. above ground, and when fully raised $17\frac{1}{2}$ in. When raising or lowering it the operator stands on the pipe handle to steady the truck.

The side members of the truck are constructed of 4-in. channels. The front has an upright member for supporting the nut through which the screw turns. The links from the framework to the platform are $1\frac{1}{2} \times \frac{3}{4}$ -in. bar. Wheels are 6 in. diameter.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

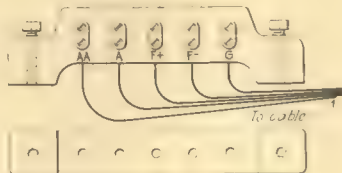
ROLLING STOCK—MISCELLANEOUS—29

Motor Lead Connection Block*

BY BENJAMIN H. HALL

Shop Foreman West Penn Railways, McKeesport, Pa.

IN ORDER to overcome trouble in wet weather due to water splashing on motor lead connectors and causing short circuits, the West Penn Railways, McKeesport, Pa., now uses a motor lead connection block of the form illustrated. This is used to join the leads from the motors and the car body. Besides overcoming trouble from the short circuiting, it has proved a great time saver when removing a truck from underneath the car or replacing motor leads.



Motor lead connecting block

The connection block is made of ash and is fastened to the car sills by lagscrews. Connectors are soldered to the ends of the cable leads and are inserted in the block from the back. These connectors have two set screws, used to fasten the wire. A piece of No. 2 solid wire is soldered to the end of the motor lead that goes into the end of the connector. The block is stenciled and wires are tagged to correspond. By use of such a block, taping of connectors or covering with canvas is unnecessary.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest

Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—MISCELLANEOUS—31

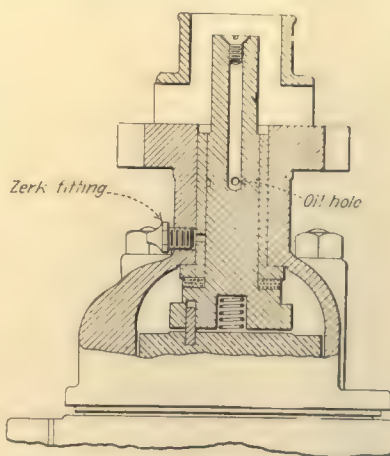
Grease Fitting Applied to Motorman's Brake Valve*

BY CHARLIE HERMS

General Foreman San Diego Electric Railway, San Diego, Cal.

ZERK fittings are being used successfully for lubricating M-24 air-brake valves on the San Diego Electric Railway. The fitting is installed by drilling a $\frac{1}{8}$ -in. hole through the valve body and bushing. The hole is then redrilled to size for tapping to take the thread of the grease fitting. This larger hole is drilled only through the body, leaving the $\frac{1}{8}$ -in. diameter in the bushing.

Experience has shown that the grease fitting should be as close to the key-seat washer as possible, and it always should be at least 2 in. below the top of the valve-stem bushing. This is necessary to prevent the grease from forcing out upward



Method of applying Zerk fitting to air-brake valve

instead of going down and lubricating the key-seat washer. Failure to lubricate this joint is the cause of stiffness of the brake valve.

A good grade of alemite grease should be used. Common hard oil and graphite grease are unsatisfactory, as they have a tendency to lodge in the small valve ports, where they solidify and cause brake failures.

The grease inserted through the Zerk fittings remains in the valves longer than oil, and the difficulties due to clogging of oil holes are prevented. The grease also is forced past the key-seat washer and lubricates the rotary valve.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Adventures of Old Man Trouble

on the

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New Equipment Available

Radio Waves Search Out Insulation Faults

RADIO waves are now used to detect insulation faults in the coils of motors, generators, and other electrical machines by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. In describing the new method, the company states that two insulation tests are necessary. First, to prove that a reasonable overload will not cause a short circuit between the windings and the frame of

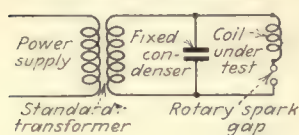
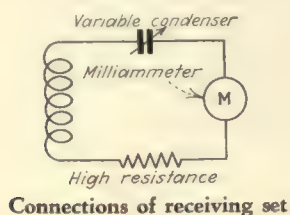


Diagram showing connection of coil under test

the machine, and second, to prove that a reasonable overload will not cause a short circuit between turns of the coil winding. The equipment used for the test is shown diagrammatically in the accompanying illustrations. Power is supplied by a standard transformer. By adjusting the length of the rotary spark gap, the point on the voltage curve at which a spark will occur is determined. This testing device is a simple type of radio transmitter.

A second diagram shows the connections for detecting faults in coils by means of a special radio receiving set having a sensitive milliammeter in the circuit. By adjusting the variable condenser the receiving set is tuned to the wave sent out by the transmitter. The milliammeter will then indicate the maximum reading. If with this setting a faulty coil is put into the circuit of the transmitter the wave length will be altered, so the receiving set will be out of tune and the milliammeter reading will drop. One of the chief merits claimed for the test is that it invariably shows the cause of the failure as the arc is of only such intensity as to burn out the weak insulation without burning the adjacent insulation or the copper.

Dick Prescott Attends a Meeting

And Gets an Ovation



WHEN Dick Prescott returned to the Consolidated Railway & Light Company's shop after having been told by General Manager Milburn of his appointment as superintendent of equipment, he proceeded with his own duties just as though nothing had happened.

Along toward the middle of the following forenoon, Tom Mullaney, retiring superintendent, sent for him. Dick responded promptly and was surprised to find all the foremen assembled and standing about Mullaney's office.

As Dick entered the room he was quickly aware that something unusual was transpiring. On Mullaney's desk, from which he had directed the destinies of the Consolidated shop for many years, was a large vase of flowers. Even Miss Stevens, Mr. Mullaney's secretary, was in the room, and it was apparent that she was responsible for the floral decorations. Everyone looked expectantly at Dick as he entered.

Tom Mullaney lost no time in getting things started. Motioning to Dick to stand beside him he addressed himself to the assembled foremen. "Gentlemen," said Mullaney with a broad smile, "I called you together to present to you your new superintendent of equipment."

A moment of silence followed this introduction, while the full import of what Mullaney had said spread through the group of foremen. Then a deafening burst of applause filled the little room. Dick was decidedly ill at ease and struggled valiantly to master the tension that welled up in his throat at this manifestation of popularity among the men upon whose co-operation his future success would depend.

"I am going to take it easy on my farm for awhile," continued Mul-

laney. He tried to say this in an offhand manner, but his own feelings at laying down the reins he had held so long were manifest in his face and his voice.

"Dick is the logical man for the job. All of you know that he has earned this promotion by initiative and hard work. I join with you and Mr. Milburn in wishing him success in this larger responsibility."

Again the room broke into applause.

"You men all know that I'm not a speechmaker," went on Mullaney as soon as he could make himself heard again. "However, I do want to say that there is a real inspiration for all of you in Dick's success. He came in here as a carpenter's assistant and he is becoming superintendent of the department after just a little more than four years. Some men are inclined to think that they need luck or 'pull' to get ahead. Dick didn't have either. But he did have a keen mind and he wasn't afraid to use it. When the company faced a problem he tried to find a way of solving it. He wasn't afraid of doing more work than he was paid for. He never claimed credit for the other fellow's ideas. He is interested in the success of the men that work with him. He's fair and he's honest in dealing with those below him in rank as well as those above him. He's got a backbone and he won't stand for any nonsense. I want to congratulate you as well as him and I'm proud to turn over to Mr. Prescott the position of superintendent of equipment."

As Mullaney finished this brief speech he turned and shook hands with Dick, pointed to his vacant chair and stepped around the table to stand with the foremen while another burst of applause—longer this time—filled the little office.

Association Activities

U. S. Chamber of Commerce Program

"TEAMWORK for Prosperity" is the subject selected by the Chamber of Commerce of the United States for its sixteenth annual meeting to be held in Washington, D. C., May 7-11, 1928. What teamwork means to agriculture, civic development, domestic distribution, finance, foreign commerce, insurance, manufacture, natural resources, production and transportation and communication will be discussed by prominent men throughout the United States. The annual dinner will be held in the Washington Auditorium at 7 p.m., Thursday, May 10. Arrangements have been made for luncheon and dinner meetings, in addition to the general sessions.

According to the announcement of the meeting, the various opportunities for teamwork, nationally and locally, and the factors affecting such teamwork, with indication of successful methods that have been pursued, will be passed in review in this meeting of business men. The new competition, business traffic rules for the future, a broader outlook on business at home and abroad are projected in this comprehensive program.

Southwestern Program Announced

STREET traffic, buses and the development of car riding are the subjects for the railway section at the convention of the Southwestern Public Service Association to be held in Dallas, Tex., May 2-5, according to an announcement by Secretary E. N. Willis.

The program of the railway section follows:

WEDNESDAY, MAY 2, AT 2 P.M.

Subject: Traffic

"Progress in Relieving Traffic Congestion," by Charles Gordon, editor *ELECTRIC RAILWAY JOURNAL*, New York.

Discussion by D. C. O'Dowd, New Orleans Public Service, Inc., and others. This will include contributions by police traffic officers as well as railway men.

"Effect of New Equipment in Speeding up Traffic," by J. L. Alexander, Houston Electric Company, and G. I. Plummer, Dallas Railway & Terminal Company.

"Personnel—Selection and Training," by C. J. Crampton, Dallas Railway & Terminal Company, and others.

Discussion by J. L. Alexander, Houston Electric Company, and others.

THURSDAY, MAY 3, AT 2 P.M.

Subject: Buses

"Buses in Interurban Service."—Discussion, led by R. L. Miller, Texas Coaches, Inc., Ft. Worth.

"Buses in Urban Service."—Discussion, led by R. B. Allen, Houston Electric Company, and W. R. Castle, San Antonio Public Service Company.

"New Developments in Rail and Rubber Borne Vehicles," by L. E. Thorne, Northern Texas Traction Company, Fort Worth.

Discussion led by R. M. O'Brien, New Orleans Public Service, Inc., and F. B. Scurlock, El Paso Electric Company.

FRIDAY, MAY 4, AT 2 P.M.

"Rebuilding the Car Riding Habit," by W. W. Holden, manager traction department, San Antonio Public Service Company, and L. C. Singleton, Eastern Texas Electric Company, Beaumont.

Mathematical Symbols

MATHEMATICAL symbols have been approved as American standards, thus completing the first step in a program of unification of the scientific and engineering symbols and abbreviations used in engineering and industry under the auspices of the American Engineering Standards Committee. The confusion resulting from variations in symbols used in different publications, reports and tables, led to the initiation of a project of unification by the A.E.S.C. early in 1923. The work has been progressing since that time, with fourteen national organizations participating.

The approved mathematical symbols include those for arithmetic and algebra, elementary geometry, analytic geometry, trigonometric and hyperbolic functions, calculus, special functions, and vector analysis. The effort was made to select from symbols already in use those that are most clearly understood and least likely to lead to confusion with other symbols.

Prof. E. V. Huntington of Harvard University, representing the American Mathematical Society, was chairman of the mathematical symbols subcommittee. This sub-committee is part of the sectional committee on scientific and engineering symbols and abbreviations, of which Dr. J. Franklin Meyer of the Bureau of Standards is chairman. The sectional committee includes other subcommittees on symbols for hydraulics, for heat and thermodynamics, for aeronautics, navigation and topographical symbols, electrotechnical symbols (including radio), symbols for photometry and illumination, and for mechanics, structural engineering and testing materials.

New York Association to Meet at Coney Island

JUNE 14 and 15, the New York Electric Railway Association will hold a two-day summer meeting at the Half Moon Hotel, Coney Island, N. Y. Special arrangements will be made to give the delegates an opportunity to inspect recent improvements and developments in the traction field in and around New York City. The banquet will be held in the Half Moon Hotel Thursday evening, June 14. A complete program will be announced later.

COMING MEETINGS

OF

Electric Railway and Allied Associations

April 25-27—American Society of Civil Engineers, spring meeting, Washington Hotel, Washington, D. C.

April 25-27—American Welding Society, annual meeting, 33 West 39th Street, New York, N. Y.

April 26-28—Missouri Association of Public Utilities, Jefferson City, Mo.

May 2-5—Southwestern Public Service Association, Dallas, Texas.

May 4—Metropolitan Section, A.E.R.A., 33 W. 39th Street, New York, N. Y.

May 6-12—Union Internationale de Tramways, de Chemins de fer d'Interet Local et de Transports Publics Automobiles, Rome, Italy.

May 8-11—United States Chamber of Commerce, Washington, D. C.

May 9—A.E.R.A. Executive Committee, Washington, D. C., 3 p.m.

May 9-10—Central Electric Railway Master Mechanics' Association, Lawrence Hotel, Erie, Pa.

May 24—New England Street Railway Club, annual meeting, Boston, Mass.

June 4-6—Midwest Electric Railway Association, Hotel Baltimore, Kansas City, Mo.

June 6-8—Canadian Electric Railway Association, annual convention and exhibits, Toronto, Canada.

June 14-15—New York Electric Railway Association, Half Moon Hotel, Coney Island, N. Y.

June 20-27—American Railway Association, Div. 5—Mechanical, annual convention and exhibit, Atlantic City, N. J.

June 21-22—American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 21-22—Wisconsin Utilities Association, Accounting Section, Hotel Pfister, Milwaukee, Wis.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

July 27-28—Central Electric Railway Accountants' Association, Detroit, Mich.

Aug. 16-17—Wisconsin Utilities Association, Transportation Section, Sheboygan, Wis.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

News of the Industry

No Transit Survey by Port Board

Governor Smith of New York disapproves bill to authorize Port Authority to consider suburban traffic problem

Governor Smith of New York on April 6 vetoed the bill which would have authorized the New York Port Authority to make a survey of the interstate suburban transit problem in the metropolitan areas with a view to enlarging the comprehensive port plan so as to include suburban traffic relief.

The Governor said that he was convinced that there was urgent need that something be done to improve suburban traffic conditions, but that he also believed the Port Authority should stick to its original program of improving freight distribution in the port.

Calling attention to the fact that he was once a member of the Port Authority, the Governor said it had been a source of pleasure to him to note the soundness of the financial principles back of that body, but that he had been disappointed because the opposition of the railroads had prevented it from making any real progress. The Governor said, in part, in his veto message:

There can be no question as to the urgent need of working out a solution of the suburban passenger traffic problem in the metropolitan district. The present railroad stations and traffic facilities in New York City, so far as suburban transportation is concerned, are already hopelessly inadequate, and no hope for the future lies in the efforts to expand these facilities.

On the other hand, I am satisfied that no solution can be found by merely dumping suburban passengers at the outlying parts of the city and forcing them into the already overcrowded city subway and elevated systems. Some solution must be found along the lines of an entirely new suburban subway system through which suburban trains can be operated connecting New Jersey, Westchester and Long Island with New York City and with each other.

Various attempts to solve this problem have been made through special legislative commissions and through private agencies and organizations. The solution now proposed is that the Port of New York Authority finance these facilities through the issuance of bonds similar to the bonds issued to finance the various Hudson River and Staten Island bridges.

No one can question my interest in and support of the Port of New York Authority. I was a member of this authority by appointment of Governor Miller between my first and second terms as Governor and represented the authority at Albany when the comprehensive plan for port development was adopted by our State Legislature. I have been and am vitally interested in carrying out this comprehensive plan.

It has been a source of great satisfaction to me to see the soundness of the financial principles back of the Port Authority demonstrated in the building of the great

bridges which are now under way. On the other hand, it has been a great disappointment to me to find that the opposition of the railroads has to date prevented the making of real progress in working out the program of freight distribution in the port which always has been the main object and purpose of the Port of New York Authority.

I am satisfied that the Port Authority should stick to this program and I am entirely unwilling to give my approval to any measure which at the expense of the solution of the great freight distribution problem will set the Port Authority off on an entirely new line of endeavor connected with the solution of the suburban passenger problem.

Free Rides in Portland to Spring Window Displays

All cars and buses of the Portland Electric Power Company, Portland, Ore., were chartered by the Chamber of Commerce recently during the spring opening. Between the hours of 7 and 8 p.m., inbound carriers served the public free of charge, as indicated on posters placed in the cars and in the stores several days previous to the affair. Thousands took advantage of the free ride to go into the loop district to view the window displays showing new spring apparel.

Suburban Fares a Problem

Cleveland Council unwilling to have railway operate in Cleveland Heights unless fare pays cost of service—Survey shows 46 per cent of riders originate in suburbs

A BATTLE is going on to extend the service-at-cost provisions of the Tayler grant to the suburbs. The rate of fare for East Cleveland over the lines of the Cleveland Railway is before a board of arbitration since the East Cleveland franchise provides for revision every five years. In Cleveland Heights the matter has taken a different course. The suburb wants a new franchise providing for extensions. The Cleveland Council has refused to approve one franchise and has served notice on the Heights it will refuse to approve any franchise unless it provides a rate of fare that will pay the cost of the service.

In both suburbs the same rate of fare is proposed by Traction Commissioner C. M. Ballou, who represents the interests of the Cleveland car riders. This is a fare always three steps higher in the Tayler grant schedule of fares than the rate of fare which prevails in Cleveland. With the Cleveland fare 7 cents cash, 8 tickets for 50 cents, the suburbs would pay 10 cents cash, 6 tickets for 50 cents.

The arbitrators in the East Cleveland fare case are Ed Doty, Charles M. Buss and Charles Higley. The situation is complicated by the fact that a portion of Cleveland extends beyond East Cleveland, so that these Clevelanders presumably could ride farther than East Clevelanders and pay a lower fare.

In a brief submitted to the arbitrators the general problem was outlined as follows:

Since March 1, 1910, the city of Cleveland and the Cleveland Railway have had a contract for railway service based on the service-at-cost principle, but not once in the entire period of 18 years have the city and the railway entered into a single contract with a suburban city on the same basis,

though strangely enough this plan was contemplated essentially in the original Tayler grant, since the costs to be met by suburban fares were definitely specified. The city of Cleveland throughout this period has had a flexible or variable rate of fare, one that fluctuates with the cost of service. The suburbs on the contrary have had a fixed rate of fare and one that does not fluctuate with the cost of service. One wonders how two such diametrically opposed ideas on systems could live side by side for so long a period without more serious friction than has actually occurred. One wonders also why this principle has never found more favorable consideration for suburban service in face of the many claims made for it in the city of Cleveland.

It is inescapable that if one part of a system has a fluctuating rate of fare which will absorb rising costs by an increase in the rate of fare and the balance of the system has no such provision, then the elastic part will assume the burden of the increased cost of the entire system and the fixed part none of the increased costs. So long as the central city is very large in comparison to a few insignificant suburbs, this arrangement can be tolerated. But can we continue to ignore the suburbs as insignificant in view of the facts already pointed out?

Meanwhile the population of the suburbs has increased until a recent survey by Parsons, Klapp, Brinkerhoff & Douglas showed that on the lines tapping the major suburbs 46 per cent of the riders originate in the suburbs and 54 per cent in the city. Last year the loss from operations in the three suburbs totalled more than \$1,000,000. Had this money been saved, Clevelanders would be riding for 6 cents today instead of paying 7 cents.

The matter of suburban fares in Cleveland has claimed much attention from the daily newspapers and from community and other papers devoted to civic subjects.

Record Men at Salt Lake City Honored

The winners of the January safety contest of the Utah Light & Traction Company, Salt Lake City, Utah, and the men having no accidents during the year just past were banquetted at the Newhouse Hotel, on the evening of Feb. 18, in honor of their successful participation in the yearly safety contest, as well as the monthly team contest.



Forty-one trainmen were successful in keeping a clear accident record for the year; four of these were operators having no accidents for a period of three years. The men holding this enviable record are John Winward, Dolph Evans, Lars Christensen and Byron Sperry. The one-year men are: C. O. Strong, Carl Peterson, Frank Pickering, William Shelton, Robert Moss, Joseph Lindsay, E. Johanson, Joseph DeBry, E. E. Crutchfield, Paul Eckman, D. B. Woodhead, Roy Goodman, H. Natter, Dan Parker, Jacob Hill, Allan Davis, Ike Roden, Charles Carlson, Vern Crawford, Fred Timmerman, Mark McDaniels, Herbert Cherrington, Bruce Tingley, W. A. Cobble, F. Groom, Karl Booth, C. McLeod, Leonard Woods, Henry Scheutter, William Schrader, J. E. Jeppson, William Summers, B. Thormstorff, E. L. Jenkins, Samuel Hazen, Robert Gee, and last, but not least, Elgin Johnson. Each of the three-year men was presented two \$20 gold pieces, while the one-year men received one.

Cor Vreeken, White team captain, was the toastmaster.

Fare Raise on Pennsylvania Line Upheld

Complaints launched by the Delaware County communities against the 2-cent increase in fares on the lines of the Philadelphia & West Chester Traction Company, Upper Darby, Pa., were dismissed April 13 by the Public Service

Commission. That body ruled that the higher rate was not unjust or unreasonable and refused the proposition of the complainants that the regular rider should be carried at a commutation rate of less than 10 cents per zone and that school children be carried at a special rate.

The company increased its cash fares from 8 cents to 10 cents on June 20, 1927 and discontinued the general sale of tickets. It was contended by the

railway that since the general use of motor vehicles was reducing its revenues fares had to be raised or the standard of service lowered.

3,600 "Ads" Submitted in Public Utility Contest

A total of 158 of the leading public utility operating companies of the United States and Canada entered the better copy contest conducted by the Public Utilities Advertising Association. They submitted 3,600 advertisements for the judging. The contest, which closed April 1, included newspaper and periodical advertising released during the previous. Awards will be made for the three best ads in each of three divisions: electric, gas and transportation. The awards will be made jointly by the Public Utilities Advertising Association with the National Electric Light Association, American Gas Association and American Electric Railway Association in their respective divisions.

The ads will be judged by a board representing these four associations, and by a committee consisting of P. L. Thomson of the Western Electric, J. C. McQuiston of Westinghouse and T. J. McManis of General Electric. The awards will be made at the annual convention of the Public Utilities Advertising Association in Detroit in conjunction with the International Advertising Association on July 10.

Refusal on Piedmont & Northern Extensions

Applications of the Piedmont & Northern Railway for permission to extend its lines of railroad from Spartanburg, S. C., to Gastonia, S. C., and from Charlotte, N. C., to Winston-Salem, N. C., have been denied by the Interstate Commerce Commission. The Piedmont & Northern construction proposals, the commission held, would result in the paralleling of existing railroads, chiefly the Southern Railway, and would not be necessary to the agricultural and business interests of the territory proposed to be traversed. It was declared by the commission that the presumption against such paralleling as was proposed could not be overcome by such evidence as was presented. That body added that the investment proposed would not be justified by the net addition to the railway revenues of the country. The order said in part:

The competitive nature of the enterprise is aggravated by the association of the applicants with large interests which have the power to control or influence much traffic on other grounds than transportation service.

There would be some advantage both to the applicants and to the communities served in joining the Piedmont and Northern to existing lines. Only a small part of the traffic handled on either is, or would be, destined to points on the other. They are being operated successfully and the evidence presented does not justify further paralleling the Southern closely for a distance of 53 miles. Upon the facts presented we find that the present and future public convenience and necessity are not shown to require the construction by the applicants of the line of railroad described.

Commissioners Esch, McManamy and Brainerd dissented from the majority and voted to grant the application. Commissioner McManamy in his dissenting opinion declared that the Southern and other railroads which objected to the Piedmont & Northern extension were among the most prosperous railroad lines of the country and not in danger from the threatened competition.

Paving an Issue in St. Paul

The matter of paving in St. Paul, Minn., has come to a head as a result of defeat early in March of a proposed charter amendment which would have relieved the St. Paul City Railway of paving obligations. As a matter of fact, half a dozen issues complicate the St. Paul situation. City officials are making efforts to prevent an increase in fare, particularly seeking to prevent the St. Paul fare from being made higher than the Minneapolis fare.

As recently as April 9 a program of paving between tracks in St. Paul was the subject of a conference between Council members and railway officials. Whether the city and the company can get together on work to be done this year by the company is likely to determine the city's policy as to future negotiations aimed at amicable settlement of the entire problem.

4:30 and 7 p.m.) and fifteen-minute headway during the rest of the day up to 6:30 p.m. when twenty-minute service will be maintained until midnight.

The terminals of the subway are the Driving Park loop at the northwestern edge of the city and Winton Road at the northeastern rim, the subway bisecting the heart of the business district. Feeder power lines have been installed to take care of the additional subway service.

The diversion of the Rochester & Syracuse cars to the subway shortens the running time between Rochester and Syracuse by ten minutes. Three interurban railroads entering Rochester now are using the subway: The Rochester & Syracuse, the Rochester & Eastern and the Rochester, Lockport & Buffalo.

President Hamilton said that the placing of the interurban cars in the subway would relieve the congestion on Main Street so that the rerouting was possible.

Macon's Utility in the News

A newspaper section covering 14 pages is given over to the history of the Macon Railway & Light Company in the *Macon News*, of Thursday afternoon, April 5, 1928. Although the story begins with the year 1902 when a consolidation put six companies under one and the present name, incidents in the chartering of Macon's first railway in 1868 are related. There are portraits of the officials, together with pictures of the morning shift, afternoon shift, construction crew, cars and routes. In addition, some well-poised advertisements for the Macon service are included. Editorial comment called attention to the improvements projected by the company and to the expected public appreciation.

New Line to Ford's River Rouge Plant

Arrangements have been approved by the Detroit Street Railway Commission for the construction by the Department of Street Railways of a new double-track extension from the city's Michigan Avenue line to the River Rouge plant of the Ford Motor Company at a cost estimated at \$85,000. Del A. Smith, general manager, says the extension will eliminate the present Ford-McGraw bus line and will result in an annual saving of \$22,000.

The money for constructing the new line will come from the sinking fund of \$3,705,000 required to make payments on the \$7,580,000 D.U.R. purchase debt due in 1931. Both G. Ogden Ellis, president of the Street Railway Commission, and Mr. Smith have approved this plan of financing as has also the department's counsel.

The general manager pointed out the economies that result from investing the sinking fund in profit producing properties rather than letting it remain in the bank at a low rate of interest.

Negotiations Reopened

With primary out of way matter of settlement of railway situation is again before Chicago Council

Members of the local transportation committee of the Chicago City Council have re-opened the local railway negotiations. They were abandoned before the April 10 primary for "political reasons." The new efforts, however, are expected to be on a much more modest scale than in the past because of the opposition indicated at the polls to Mayor Thompson and Governor Small, who are in agreement on the nature and method of obtaining the proposed railway legislation.

It is understood that the transportation committee will now confine its activity to obtaining passage of only two of the five bills recently drafted—one, creating a local transit commission; the other, amending the cities and villages act to permit term franchises longer than the present twenty-year limitation. Whether or not Governor Small, in the light of his defeat for renomination, will abide by his decision to summon a special session of the Legislature next month to enact legislation to help settle Chicago's railway problem, is a matter of speculation among the Aldermen. Many believe that the proposed session was merely a campaign promise. Representatives of the railways have refused to comment on the franchise negotiations or legislative bills, but they are reputed to be at work on a new plan for a settlement.

When the local transportation committee discontinued discussion on the bills early in March, five proposed legislative measures were before them, one for home rule, one creating the terminable permit, another authorizing the construction of subways by special assessment, a fourth permitting the consolidation of the local railway systems and one amending the cities and villages act to remove the twenty-year limit on franchises.

Three of these bills had been recommended for passage to the full transportation committee by a sub-committee. These were the measures dealing with home rule, subway construction, and consolidation of systems. The bills on terminable permits and on amending the cities and villages act are still being considered by the subcommittee.

Baltimore Fare Suits Set for Hearing

Judge Joseph N. Ulman, in the Circuit Court, Baltimore, Md., has signed an order setting April 30 as the date to open all the cases involving the street car fare in Baltimore. The cases will be tried on the same record. All the suits are against the Maryland Public Service Commission, which recently authorized the United Railways & Electric Company to charge a fare of 9 cents straight or three tokens for 25 cents.

The Maryland Public Service Commission has answered in the Circuit Court, Baltimore, Md., the bills of com-

plaint of the People's Corporation and the Socialist party of Maryland. Both these bills seek to restrain the commission from enforcing or continuing its order under which the United Railways & Electric Company, Baltimore, was permitted to charge an 8½-cent fare. Recently the commission answered a bill filed by the United through which the latter seeks to restrain the commission from interfering with a straight 10-cent fare.

Does Municipal Ownership Loom at Youngstown?

Henry Engle, street railway commissioner at Youngstown, Ohio, says the city may be forced, as a matter of self protection, to take over the local railway and bus lines due to the movements now under way to expand the city. Railway extension, north, south and west, may be necessary as a result of expansion in those directions and in the event the Municipal Railway can not agree to make those extensions the city may be forced to provide for its own transportation development.

More Jacksonville Franchises Drawn

The Council of Jacksonville, Fla., has received drafts of two proposed ordinances from Peter O. Knight, Tampa, counsel for the Stone and Webster interests in Florida, for comparison with the proposed franchise drawn by the Jacksonville citizens' committee to be granted to the Jacksonville Traction Company. It is expected that Mr. Knight or some official of the local railway will explain the two drafts to the Council and that all three drafts will be referred to a special committee to compile a franchise for the company that will prove satisfactory to the city and company alike.

Bright Cars for Summer in Norfolk

On the theory that summer equipment should have a summer appearance to attract riders, officials of the Norfolk division of the Virginia Electric & Power Company have announced that they had decided to repaint open cars used in handling resort traffic in bright colors, resembling awnings and porches. The tops of the cars will have orange and blue 18-in. strips, with the upper body and supports in cream color and the lower body in bright green.

Rehearing on Peoria Opposition

Peoria, Ill., has been granted a rehearing in the matter of its opposition to the proposed fare increase sought by the Illinois Power & Light Corporation from the Illinois Commerce Commission. Effective on March 1 the railway abolished the permit card and seven tokens for 50 cents system for a three for 25 cent system and a straight 10-cent cash fare.

Counsel for Brooklyn Companies Deplored Attack on Commission

Clarence J. Shearn, special counsel for the Brooklyn City Railroad and the Brooklyn-Manhattan Transit Corporation in the bus hearings, said on April 17 that "there is no basis whatever for any reflection upon the Transit Commission, political or otherwise." He did this in reply to the charges made by William Bullock, director of the city affairs committee of the New York County Republican Committee.

Mr. Shearn explained that his clients were opposing the application of the Equitable Coach Company, which was attacked in the Republican statement, because the proposed bus system would cripple the surface lines. He said:

In recent statements issued for publication by the city affairs bureau of the Republican County Committee dealing with the Equitable Coach Company the Transit Commission, before which proceedings are now pending, is characterized as "a Tammany Commission" and severely criticized for its conduct of the case. My clients, the Brooklyn surface railroads, strongly deprecate any attempt to turn a judicial hearing into a political controversy.

Believing that the injection of 60 miles or more of competitive bus routes parallel with established surface lines would have a crippling effect upon the companies that must be depended upon to carry 500,000-600 passengers annually, the case of the surface lines is, naturally, being tried thoroughly and vigorously. The Brooklyn companies rely upon the merits of their case for success and consider it unfair and unfortunate that a political attack upon the tribunal charged with responsibility for deciding the case should be made in the newspapers.

While we have urged before the commission that the financial ability of the Equitable Coach Company should be established in the first instance, and thus perhaps save the expense of a long drawn-out contest, we have bowed with entire respect to the decision to postpone this issue until the various routes have been passed upon.

On behalf of the Brooklyn surface companies I wish to state that we feel that Commissioner Godley has conducted these hearings with marked ability, with complete fairness and with great patience, and there is no basis whatever for any reflection upon the Transit Commission, political or otherwise.

North Shore Goes After Business

The third annual better business campaign of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., has been launched. In the January and February drives five different departments scored 100 per cent of their quota and a total of 5,247 new business tips was submitted. In addition to the \$300 in regular quarterly prizes four special awards totaling \$100 will be made during the first-quarter for the largest number of tips resulting in sales of 25-ride commutation tickets.

Records for the 1927 campaign activity show that 48 per cent of the North Shore Line personnel took part in the organized drive for new business. Tips on sources of additional business turned into the traffic depart-

ment by employees during the year totaled 16,654. It is estimated that 36 per cent of these tips were converted into additional business to the railroad.

Abandonment Petition of Pacific Electric Withdrawn

Following an agreement reached by officials of the railway and the city of Redlands, Cal., the application of the Pacific Electric Railway to abandon the Smiley Heights car line was withdrawn on March 29, when the hearing opened

Extension Appeal in O'Fallon Case

Federal District Judge Harris, at St. Louis, has granted the St. Louis & O'Fallon Railroad a time extension to May 9 for the docketing of the valuation appeal in U. S. Supreme Court. Postponement of the docketing means the case will not be argued this term, since arguments usually close late in April. It is expected a motion will be made to advance the case for hearing early in the next term, which opens on Oct. 1.

"You Must Share This Responsibility"

THERE comes a time when community progress stops. Its most common enemy is lack of civic interest—lack of honest consideration for the agencies that make a community happy, prosperous and progressive.

Had the public banded together to block all street paving projects Wichita could not have reached its present size.

Had the majority been opposed to the bond issues that made possible our beautiful new schools and University, Wichita would not rank as an educational center.

Had you fought the hundreds of improvements that together have made Wichita a city of over a hundred thousand population, your investments, your real estate and your business would be worth only a fraction of today's value.

Yet the one agency that *must* grow even faster than the community is held in check—*Transportation*. If Wichita fails to maintain its present rate of growth it will be because of lack of transportation facilities. The arms of the bus and street car lines must penetrate the outlying districts before a community can be built.

Lack of an adequate transportation fare must necessarily curtail maintenance and extension. Without an adequate fare the entire growth of Wichita will be undermined. It is your responsibility to see that Wichita transportation lines are maintained and extended. It is your responsibility to see that the transportation company is granted a rate sufficient to maintain and surpass its present service.

This is a serious matter and deserves your careful consideration. Without an increased rate transportation will suffer—without transportation the growth of Wichita will suffer.

Think it over—Wichita, Kan., "Eagle."

before the Railroad Commission. The agreement provided that the Pacific Electric continue to operate the line, and keep it in good shape and operate cars on a schedule as reliable as that now in use. Certain paving requirements were mentioned in the pact. The city of Redlands opposed abandonment.

Skip-Stop Voted in Omaha

A straw ballot on abolishing the skip-stop in Omaha, Neb., taken at the recent primary election resulted in 14,184 negatives and 8,083 affirmatives. Only one line reported a majority in favor of abolition on the Omaha & Council Bluffs Street Railway. Manager Porter devised the ballot for the purpose of finding out if the demand evidenced by complaints was a universal one. He told the patrons that the abolition would cost the company from \$30,000 to \$40,000 a year and distributed cards showing the delay to traffic under the proposed plan.

Utility Story Told Effectively

The Penn-Ohio System, Youngstown, Ohio, has reproduced in booklet form, principally for the further information of Penn-Ohio investors, the series of advertisements which appeared in the New York *Times Annalist* during the early months of 1928.

Their purpose was to acquaint business men with the facts about the remarkable growth which the Penn-Ohio System has enjoyed, and also to state to the public the principles and ideals which underlie the Penn-Ohio policies and management.

The ads. referred to previously in *ELECTRIC RAILWAY JOURNAL*, provoked much favorable comment both from the standpoint of their content and the manner of their presentation. "The Penn-Ohio System—Its Place in the Community" deserves a place in the portfolio of all executives interested in the subject of better public relations.

Recent Bus Developments

Georgia Commission Restrained Until Court of Appeals Ruling

A permanent injunction restraining the Georgia Public Service Commission from exercising jurisdiction over the bus lines in the state has just been denied by Judge John D. Humphries, of the Fulton Superior Court. However, Judge Humphries issued a supersedeas order keeping the temporary injunction in effect until the State Court of Appeals can construe the law.

Attorney Paul Lindsey, representing the bus line operators, contended that the Public Service Commission had no jurisdiction over buses, since they were not common carriers. Attorney S. J. Smith, Jr., representing the Public Service Commission before the court, held that buses were common carriers and as such amenable to the rules and regulations of the State Public Service Commission. Judge Humphries held that the buses were common carriers, and denied the petitioners a permanent restraining injunction.

Reading Wins Franchise Over P.R.T. Objection

The Reading Transportation Company, a subsidiary of the Reading Company, was granted the right to operate buses between Jenkintown and New Hope by the Public Service Commission on April 12 over the protest of the Philadelphia Rapid Transit Company, Philadelphia, Pa. The commission upheld the application on the ground that the bus service was intended to supplement rail service between those two points. The Philadelphia Rapid Transit Company operates electric lines through part of the territory which the Reading buses will serve.

The Reading buses will stop at 24 intermediate stations between Jenkintown and New Hope, but will not pick up incidental traffic along the road.

Permits Sought for Extensions in St. Louis

An application has been made by the St. Louis Public Service Company, St. Louis, Mo., to the Board of Public Service for a permit to operate a bus line from Grand Boulevard and Meramec Street southward along Grand-Kings Highway to Carondelet Park, a distance of 1.75 miles. It is planned to use three single-deck, pneumatic tired buses on this route. This bus line would be considered as part of the railway service. The fare would be the same as on the street cars, 8 cents or two tokens for 15 cents and transfers would be issued to and from the cars without extra fare.

The company has also sought author-

ity to install a bus line on Kings Highway between Oakland and Southwest Avenues to connect the Southampton with the Manchester, Market and Taylor Avenue lines and through those street cars with other lines in Central and North St. Louis. The fare on this line would also be the same as on the street cars with transfer privileges. On this line three single-deck, pneumatic-tired buses would be used.

Insulls Participate in Deal for Chicago Terminal

Control of the Chicago Consolidated Bus Terminal Building Corporation has been acquired by the Insull, Motor Transit and Yellowway interests, the three largest interstate operators entering the city. Plans are practically completed to start operation of the modern terminal at Wabash Avenue and Roosevelt Road which has lain idle up to the present time.

The terminal will be used jointly by the Motor Transit Corporation, with its Greyhound, Royal, Rapid, Oriole, Mohawk, and other subsidiaries: The Shore Line Motor Coach Company, Metropolitan Motor Coach Company, Western Motor Coach Company, and by Yellowway, Inc. For the present these lines will retain existing terminals merely as stops to pick up passengers.

New Service in Marinette-Menominee

Electric railway cars in Marinette, Wis., and Menominee, Mich., were replaced by buses on March 24. Eight buses have been placed in service, four being licensed in Wisconsin and four in Michigan. These eight Reo buses are the latest in 21-passenger city coach transportation equipment. Street car tokens are being redeemed in exchange for bus tokens.

The fare for children on the new bus lines, and in fact for all transportation systems operated by the Wisconsin Public Service Corporation, is determined by height rather than by age. Marks on bus doors indicate the height of children. Those under 40 in. are carried free if accompanied by a person paying fare. Children more than 40 in. and less than 52 in. pay half fare and those over 52 in. full fare, except where special rates for school children are in effect.

The substitution of bus service for railway lines in the Twin Cities loomed as long ago as early in 1927 when J. P. Pulliam, vice-president and general manager of the Wisconsin Public Service Company, stated that railway service in Marinette and Menominee had been supplied at a loss of \$80,000 in 1926.

Minnesota Vehicle Law Upheld

The Minnesota Supreme Court on April 13 upheld the state vehicle regulation law of 1925 under which the Railroad & Warehouse Commission licenses bus lines operating between fixed terminals. It affirmed the denial by Judge B. F. Wright of Itasca district court of the plea of Andrew J. LeFebvre to set aside the order by the commission denying him permission to operate buses for 38 miles between Grand Rapids and Hibbing. He had been granted a license to operate until a federal mail contract expired on July 1, 1927. The complainant charged that the act was discriminatory and the state had gone beyond its authority.

The higher court ruled that the state had control of its highways and might prohibit intrastate common carriers by motor vehicles from doing business unless licensed by the commission. Even though it excludes taxicabs, hotel and school buses and vehicles transporting farm products from regulation, the act is held not to be discriminatory.

Repair Work Expedited by Running Buses at Night

The Washington Railway & Electric Company, Washington, D. C., has obtained permission from the Public Utilities Commission of the District of Columbia to conduct with buses an owl service on three of its rail lines. This plan of service, which is scheduled to go into operation on May 1, will result in saving \$18,000 a year, according to the estimates of officials. The three lines affected are: Lincoln Park-Georgetown; Ninth Street-Brightwood, and the Columbia line.

Although these lines constitute some of the longest hauls on the company's system, it is expected that fifteen buses, each making eight trips per night, will be sufficient to give the service. Officials point out that this bus operation will greatly facilitate track repair work, the major part of which is done during the night hours in order to interfere as little as possible with car schedules. Because of the prevalence of the conduit trolley system in Washington it is practically impossible to run temporary lines around repair work and considerable difficulty is therefore experienced in handling owl cars when the repair crews are at work.

Bus Service Sought on Berkeley Line

An application has been made by the Key System Transit Company, Oakland, Cal., to the California Railroad Commission for permission to abandon its present railway service from the intersection of San Pablo and Ashby Avenues, to the Hotel Claremont, in the city of Berkeley. A certificate of public convenience and necessity is sought to operate bus service over the route now traversed by the railway.

Necessity for Regulation Shown

Conclusion to this effect seems inescapable from trend of testimony presented before the Senate Committee on Interstate Commerce which is considering the Parker Bill for regulation

CHANGES in the Parker bill to regulate interstate buses that will lead toward greater centralization of authority and consequently away from home rule by the state regulatory board seem likely as a result of the recent hearings before the House committee on interstate commerce, but nothing conclusive can be stated because all presumptions necessarily are based on things that are intangible.

As indicated in the *ELECTRIC RAILWAY JOURNAL* for April 13, S. A. Markel, chairman of the Legislative Committee, Bus Division, A.A.A., outlined the case for the bill. He introduced a group of ten amendments, mostly to clarify the wording.

At the hearing on the second day Samuel I. Lipp, representing the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, favored early passage of the bill as drawn with a change of definition for motor carriers to include all bus operators in interstate service of any kind and omission of the grandfather clause.

Frank R. Fageol expressed his conviction that the interstate bus business should be regulated. He suggested, however, that the grandfather clause might well be modified so as to permit carriers to prove the convenience and necessity of their operation on the basis of their revenue per mile or the riding factor. He emphasized his belief that it was not the function of the manufacturer to concern himself with the formulation of the terms of the statute under which the operators of his product would be regulated.

The third day was opened by Judge C. C. McChord, former chairman of the Interstate Commerce Commission, reading a statement outlining the position of the National Automobile Chamber of Commerce. He said that at the present time a provision for issuing a certificate of convenience and necessity is enough, that insurance is necessary but that the states now have power to compel its carriage, that the machinery provided by the bill is hopelessly complicated and grave doubt exists that it is constitutional, and last that, because of the diversity of conditions, the matter should be considered carefully.

Following Judge McChord, La Rue Brown took up the case specifically for the N.A.C.C. He said the Chamber accepted a statement of the motor carriers themselves that regulation was needed and consequently favored regulation of the kind proposed. A radical extension of regulation by the federal government was being proposed and he entertained grave doubts about it being constitutional. In this connection Mr. Brown quoted Chief Justice Fuller to the effect that delegation of federal power to local governmental units is unconstitutional.

Mr. Brown continued with the assertion that while the N.A.C.C. believed

regulation is needed, it should rest lightly on the operating industry. Probably this could best be done with a federal commission, which could be either the I.C.C., a part of it or a separate board. This plan would be complex but not nearly as much so as the procedure outlined in the Parker bill. If regulation were put into effect it would be enough to have certification only, with revocation of the certificate as a disciplinary measure. He felt that all carriers operating one year should be granted certificates as a matter of right. In conclusion, he said that the N.A.C.C. favors regulation, but wants the committee to remember that the motor carrier industry is new and that requirements may be added to any system of regulation much more readily than they can be dropped.

Three other witnesses appeared at the fourth session. A. R. Williams, general manager of the United Electric Railways, Providence, R. I., urged that the bill be passed in order to protect investor's capital. Day Baker representing the Motor Coach and Bus Association of Massachusetts, favored regulation but felt that the time was not ripe for fixing rates. C. W. Fairchild, representing a group of casualty and indemnity insurance companies, felt that the bonding provisions of the proposed law should be amended since it was very doubtful whether his companies or any others could write insurance for the carriers under the bill as it now stood.

When the session was resumed after adjournment over the week end associations that favor the bill began their rebuttal presentations. John E. Benton of the National Association of Railroad and Utilities Commissioners, reiterated that few buses out of the total are in interstate service and consequently the state boards should have power to control these few along with the many. Most interstate lines, he continued, are comparatively short, operating through only two states. Before the Buck and Bush cases the states did well in regulating the interstate bus and should be empowered to take it up again. Regarding constitutionality of the proposed law Mr. Benton felt that if there were doubt it would be worth while to use it as a test.

At the hearing on the last day George H. Pride, representing the New York Board of Trade and Transportation, opposed the bill. Mr. Pride said no law is needed, that its passage would allow the railroads to stifle the bus business and consequently that it would be against the public interest.

The proponents of the bill then took up their rebuttal arguments. C. D. Cass, for the American Electric Railway Association, quoted Examiner Flynn's report concerning the abuses now found in the interstate bus industry. He said reliable transportation could be

obtained only by a certification provision. Essential to any such act as the one contemplated are four points: Certification, protection for passenger, rate regulation, and the necessary machinery. He again brought up Mr. Benton's contention that operation through many states is exceptional. In the case cited by Mr. Brown the applicant would get some law student to file carbon copies of the application with each state board. Mr. Cass thought each state should have a veto power, with provision for appeal to the Interstate Commerce Commission.

A second session was held on this last day to complete the hearings. In concluding his remarks Mr. Cass charged that the N.A.C.C., is only attempting to obstruct passage of the bill. He could not understand why the manufacturers should appear at a matter concerning the operator.

E. W. Wakelee for the Public Service Co-ordinated Transport, made a clean cut plea for protection of existing utilities in the interest of the public. Cut-throat competition, now provided by interstate operators in the territory his company serves, is ruining the existing transportation companies. This is not to the interest of the public. He brought out specific instances of the irresponsibility of the bus operators. Competition is continuous. The regular operators must keep a huge reserve of equipment for peak loads, but their competitors avoid this burden. He believed that the newcomers in the field should bear their full share of the burdens of regulation.

Mr. Cass read into the record a statement by B. B. Cain, general counsel for the American Short Line Railway Association, to the effect that he was in harmony with attempts to secure passage of the bill as presented.

Alfred P. Thom, Jr., for the Association of Railway Executives, said the public was entitled to any form of transportation it wants, if it is economically sound. The rights of rail lines must be considered if the institution of bus operation will affect the steam road so substantially that it cannot carry out its obligations to the public. The mere existence of a rail line, however, should not be enough to cause refusal of a certificate to the bus company. To contend that investment in present bus lines should be protected by a grandfather clause while ignoring the investment in rail lines is inconsistent.

In summing up the case for those who favor the bill S. A. Markel said the necessity for regulation had been shown by the following:

Examiner Flynn's report.

The approval of the National Association of Railroad & Utility Commissioners.

The support of the Bus Division A.A.A.

The backing of the railroads, both steam and electric.

The admission by every witness before the committee to the effect that some form of regulation is necessary. Even the witness most opposed to the bill admitted that regulation regarding insurance was necessary. He said that the public have a tremendous investment in the highways and those persons who do not own private automobiles should have the use of this tremendously costly system by means of public automotive conveyances.

Financial and Corporate

Diversion of Detroit Sinking Fund to Improvement Defended

During March, the net income of the Department of Street Railways at Detroit, Mich., after sinking fund payments was \$26,362, compared with \$67,402 a year ago. In March 43,761,251 passengers were carried. This is 500,838 fewer than in March, 1927.

According to William M. Hauser, auditor, \$1,589,652 has been taken from the department's sinking fund for use in financing improvements of the system. He says the increased savings from these expenditures will make it possible to restore the original amounts to the fund before the final purchase payment is made by the city to the Detroit United in 1931.

The auditor's statement accompanying his monthly report refers to the communication addressed by the governmental committee of the Detroit Board of Commerce to Mayor Lodge and the Common Council with respect to certain reserves of the D. S. R. which were not funded. The funds for these reserves have been used for road and equipment (capital costs, so-called) temporarily.

Disbursements have been made for road and equipment (capital costs, so-called) in excess of the resources and funds available for that purpose, so that \$1,589,652 will have to be provided from future earnings, in order to restore funds to certain reserves which it has been the department's policy heretofore to fund.

Washington Merger Bill Before Congress

Another move toward the proposed merger of the transportation lines of the District of Columbia was made on April 14 when the Public Utilities Commission transmitted the revised unification agreement to Congress. The agreement will have to be ratified by the Senate and House before it can be made effective.

The commission's letter of transmittal contained the draft of a proposed bill to make the merger agreement effective, together with a brief review of the history of the merger agreement and the correspondence between the District Commissioners and the Bureau of the Budget with respect to certain provisions providing for the transfer of the cost and maintenance of paving between car tracks and the payment of the salaries of crossing policemen from the consolidated company to the taxpayers of the District.

The merger plan had been before the Utilities Commission since Oct. 31, 1927, when Harley Peyton Wilson, principal owner of the Washington Rapid Transit Company, submitted a skeletonized outline of a scheme for con-

solidating the companies. This plan formed the basis of the merger agreement, which was later subscribed to by the boards of directors and stockholders of the companies. The agreement, however, was modified by the Public Utilities Commission before it approved the document.

Senator Capper, chairman of the Senate District Committee, is reported to have said that there was some doubt as to whether a merger bill could be passed at this session. He based this belief on expression that had come from several of his colleagues.

Purchase Discussions Resumed in New York

Negotiations between Samuel Untermyer, special counsel for the New York Transit Commission, and representatives of the Brooklyn-Manhattan Transit Corporation, have been resumed. The object is to reach an agreement for the purchase of the B.-M.T. properties by the city as the first step in a program of transit unification.

The main outlines of the proposed agreement are said to have been drafted and both sides are virtually in agreement. This tentative draft includes the method of exchange of securities in payment for the lines and practically everything except price.

A committee of engineers representing the city, the Transit Commission and the company has been at work for several weeks compiling data which will be used in the subsequent price negotiations.

The immediate concern of the conferees is said to be to find a way to overcome the handicap which resulted from the failure of the Legislature to pass the Untermyer bills. Mr. Untermyer does not believe the bills were essential, but the railway representatives felt differently about them. Now, however, they are said to be willing to join in a test suit in the courts to clear up some of the points involved.

Good Showing in Toledo in March

According to the March report of operations of the Community Traction Company, Toledo, Ohio, total revenue was \$321,377 against \$311,192 for the similar month last year. The statement showed 4,481,629 passengers compared with 4,358,747 for March, 1927. The showing this year is better than in any previous month this year or last year.

Due to the expiration of the sinking fund payments, the operations for March resulted in a surplus of \$25,449 for the stabilizing fund after all charges required under the Milner ordinance. Operating expenses were \$220,424 against \$224,972 for March last year.

Considerable additional service has been operated and coach mileage has been increasing. The railway system showed 536,959 car-miles at a cost of 39.404 cents per car-mile and total revenue of 53.322 cents per car-mile. Buses were operated 121,989 miles with total revenue of 27.638 cents per mile and total expense and taxes of 22.559 cents per mile. The short special bus runs were most profitable, while the Long Belt was the most profitable car line.

Traffic, Fare and Wage Figures

Evidence of improvement in electric railway traffic was noted in January. The number of passengers carried was less than in January, 1927, but the amount of the decrease was not so great as that registered for December. The number of revenue passengers, including bus passengers, reported by 212 companies to the American Electric Railway Association for January, 1928, compared with January, 1927, is as follows:

January, 1928.....	843,241,464
January, 1927.....	860,850,256
Decrease, per cent.....	2.05

Average cash fares in cities of 25,000 population and over:

	Cents
February 1, 1928.....	8.1070
January 1, 1928.....	8.0953
February 1, 1927.....	7.9015

The average maximum hourly rates paid motormen and conductors in two-man service by companies operating 100 or more miles of single track:

	Average Hourly Rate, Cents	Index Number 1913 = 100 Per Cent
February 1, 1928...	57.36	214.50
January 1, 1928...	57.27	210.17
February 1, 1927...	56.94	208.95

Report Lord Rothermere After British Columbia

Dispatches from London report that Lord Rothermere and associates had made a bid for the British Columbia Electric Railway, Vancouver, B. C., Canada. The deferred ordinary shares rose by nearly 40 points to £275 per share, while the preferred ordinary was up 60 points to £235. The reported offer for the railway stock is £280 the share for the deferred and £240 for the preferred. Stock of the British Columbia Electric is all of £1 par value. As of June 30, last, the company had about £8,000,000 of stock of various classes outstanding. Last December additional stock was created and this will probably be included in the deal, although that is not made plain.

The British Columbia Electric Railway is an English company. It operates the electric power, gas and railway services in Vancouver, New Westminster, Point Grey, etc., and Victoria and Esquimalt, serving in all an area

in excess of 1,500 square miles. There has been a gradual segregation of assets under the principal Canadian company of the group, the British Columbia Electric Power & Gas Company, a British Columbia incorporation of 1926.

Total assets of the company as shown in the consolidated balance sheet for the year ended last June 30, are \$66,856,866. Gross earnings for 1927 were \$12,313,394.

Sale of Indiana Interurban Set for April 30

The property of the Indianapolis & Cincinnati Traction Company, Rushville, Ind., in the hands of a receiver, has been ordered sold on April 30 by Judge Will M. Sparks in Circuit Court after a motion for a new trial had been overruled. C. T. De Hore, a prospective purchaser, has an option on \$2,600,000 of the company's bonds and it is expected that he will bid in the road in behalf of himself and his associates.

Terms of Proposed Ohio Merger Announced

After conference with the holders of substantial amounts of stock of the Northern Ohio Power Company, the directors of the Penn-Ohio Edison Company, on April 12, approved a plan and agreement of reorganization under which the Penn-Ohio Edison Company is to acquire at least a majority of the capital stock of the Northern Ohio Power Company. In furtherance of the proposal a meeting of stockholders of the Penn-Ohio Edison Company is to be held on May 1, 1928, to reorganize by (1) increasing its authorized shares of common stock to 2,000,000 shares without par value; (2) approving the plan; (3) authorizing the officers to take all necessary action.

Holders of capital stock of the Northern Ohio Power Company who deposit their certificates of stock properly endorsed will become parties to the plan. For each share of stock surrendered for exchange, if the plan becomes operative, there will be delivered $\frac{3}{4}$ share of common stock of the Penn-Ohio Edison Company and $\frac{1}{4}$ of an option warrant, series B, each option warrant, series B, entitling the holder to purchase 1 share of common stock of the Penn-Ohio Edison Company at \$50 per share if exercised on or prior to Dec. 31, 1928; at \$55 per share if exercised during the calendar year 1929; or at \$60 per share if exercised thereafter but on or prior to its expiration date, Nov. 1, 1935.

The plan is to become operative only upon favorable action by stockholders of Penn-Ohio Edison Company, the approval of counsel, and the deposit of 70 per cent of the capital stock of the Northern Ohio Power Company or at least a majority of the capital stock of the Northern Ohio Power Company on or before May 15.

Upon completion of the exchange, giving effect to the deposit of all of the capital stock of the Northern Ohio Power Company, the outstanding capitalization of the Penn-Ohio Edison Company will be

\$5,999,000 debentures 6 per cent due November 1, 1950.
\$8,151,800 7 per cent prior preference stock.
49,229 shares \$6 preferred stock (no par).
717,003 $\frac{3}{4}$ shares common stock (no par), including scrip for fractional shares.
119,270 option warrants issued in 1925 expiring Nov. 1, 1935, for purchase of common stock at \$25 per share.
166,650 option warrants, series B, for purchase of common stock at \$50 per share to Dec. 31, 1928; at \$55 during 1929, and at \$60 thereafter to expiration date Nov. 1, 1935.

Increase in Pittsburgh's Net Revenue

Recession in many lines of business and the continued subnormal condition of the bituminous coal mining industry affected the Pittsburgh Railways throughout the year 1927

OPERATING revenues of Pittsburgh Railways, Pittsburgh, Pa., for the year 1927 were \$21,525,912, a decrease of \$362,447, or 1.6 per cent as compared with 1926. By constant attention to details of management, scientific research in operating problems and the adoption of new economical methods, the company was enabled to reduce operating expenses \$390,446, or 2.2 per cent, to \$17,066,567. Net revenues after depreciation increased \$27,999, or 0.6 per cent, to \$4,459,345. The company was able to meet all obligations in accordance with its operating agreements and closed the year with a satisfactory addition to surplus.

As a result of the company's belief that its task of rendering street car service is facilitated and there is greater likelihood of improvement in operations when the many problems which arise are approached from the standpoint of scientific research, recourse to this method of approach is playing an important part in placing operations on an efficient basis since light is thus being thrown on various problems by the dissemination of information throughout the organization.

Considerable time has been devoted to designing an improved street car that will attract more car riders. In this age of keen competition for traffic, new cars must feature quicker acceleration and still more comfortable riding qualities. Further additions to equipment have awaited the results of joint studies with car builders based on experimental cars under construction.

During 1927 the operations of the company continued to show a steady improvement. The number of car failures was reduced from an average of 1,203 per month in the preceding year to an average of 182 per month. Fewer cars awaited shop repairs. The installation of meters on all cars to measure the current consumed in daily passenger service is making it possible to isolate instances of uneconomical practices requiring instruction and to discover defective equipment more quickly. Instal-

It is planned that the generating plants of the respective companies ultimately will be physically interconnected as are the railways at the present time. This should increase operating efficiencies, for it will diversify the load and since the Penn-Ohio property now has generating capacity greater than its immediate needs and ready means of adding thereto should benefit the Northern Ohio, which is now purchasing a substantial part of its power requirements.

Dividends are being paid by the Penn-Ohio Edison Company at the rate of \$1 per share in cash and 1/25 of a share of common stock per annum.

lation of a mechanical device which records the spacing of cars on the different routes was begun and will be completed during the coming year. The purpose is better maintenance of schedules through automatic communication to

SUMMARY OF INCOME AND PROFIT AND LOSS OF PITTSBURGH MOTOR COACH COMPANY FOR 1927

Operating revenues	\$483,569
Operating expenses:	
Maintenance of equipment	\$98,615
Traffic	7,414
Transportation	187,364
General administrative	25,759
Other general	27,871
Taxes	18,932
	<u>365,955</u>
Net revenue from operations...	\$117,613
Non-operating revenues	\$1,504
Non-operating expenses	110
Net revenue from other operations	<u>1,393</u>
Gross income	\$119,007
Income charges:	
Interest on unfunded debt	\$12,043
Less interest charged to construction	841
	<u>11,201</u>
Net income before appropriation	\$107,805
Appropriation for retirement (depreciation) reserve	<u>62,848</u>
Net income for the year	\$44,957
Surplus, Jan. 1, 1927	<u>20,851</u>
Gross surplus	\$65,808
Deductions from surplus:	
Loss on equipment retired from service	\$11,381
Miscellaneous (net)	1,392
	<u>12,773</u>
Surplus, Dec. 31, 1927—per balance sheet	\$53,035

STATISTICS OF PITTSBURGH MOTOR COACH COMPANY

Garages operated	1
Routes operated	6
Route miles operated (single way)†	25.2
Coaches owned	50
Revenue coach-miles operated††	1,348,333
Passengers carried	1,834,752
Passenger revenue per revenue coach-mile, cents*	36.82
Average fare per passenger, cents.	24.70
*Including special coach revenue and mileage.	
†Excluding 24 and 74 sightseeing routes.	
††Including special coach mileage.	

SUMMARY OF INCOME OF PITTSBURGH RAILWAYS FOR THE YEAR 1927

(Prepared in accordance with the terms of the agreement between city of Pittsburgh, sundry other municipalities, Philadelphia Company and Pittsburgh Railways)

Gross revenue from street railway operations	\$21,365,542	
Operating expenses:		
Maintenance of way and structures ..	\$995,558	
Maintenance of equipment	1,047,380	
Traffic	170,047	
Power	2,034,998	
Transportation	7,463,135	
General	1,036,817	
Miscellaneous	1,508,730	
Depreciation	2,055,245	
Taxes	608,137	16,920,047
Net revenue from street railway operations		\$4,445,495
Auxiliary operations:		
Operating revenues	\$160,369	
Operating expenses (including depreciation)	146,520	
Net revenue from auxiliary operations		13,850
Total net revenue from operations		\$4,459,345
Non-operating revenues:		
Rental of real estate and buildings	\$20,461	
Interest and discount	150,203	
Miscellaneous	4,191	
Total	\$174,856	
Non operating expenses	9,198	
Net revenue from other operations		165,658
Gross income	\$4,625,003	
Income Charges:		
Items under agreement:		
Return of 6 per cent on property valuation of \$62,500,000	\$3,150,000	
Return of 6 per cent on additional capital for new property	328,800	
Payments to county of Allegheny, city of Pittsburgh and other municipalities in lieu of licenses, paving assessments, etc.	429,168	
Amortization of debt discount and expense on additional capital	67,325	
Items not under agreement:		
Interest on judgments and settlements	1,324	
Rental of seventh Street incline plane ...	7,102	4,583,720
Net income for the year		\$41,283

headquarters, which provides means for meeting emergencies and reducing delays due to blockades. Every means is employed, through close supervision and control of operations, to insure more reliable service.

The one-man car has been developed to a point where it compares with the two-man car in safety, speed and comfort. To these qualities it adds economy of operation which permits the company to give more frequent service. There are now 247 cars of this type on 33 routes, and this operation is proving uniformly successful. The fact that last year 23.01 per cent of the total mileage was one-man operated, as compared with 14.67 per cent in 1926, indicates the growth of this class of service.

In 1927 the Pittsburgh Railways operated its cars at the rate of 3,091 miles per accident, an improvement of 4.2 per cent over 1926. Accidents involving employees decreased 8.75 per cent, and those involving the public reduced 3.5 per cent. These records are indicative of accomplishments growing out of the company's accident prevention policy. In recognition of this performance the company received a certificate of honorable mention in the Anthony N. Brady Memorial Award for excellence in accident prevention and health promotion work.

The effort of the management to inform employees concerning the problems of management and to obtain their suggestions in formulating plans and policies has, according to President A. W. Robertson, met with a ready response and "the co-operation received from employees has helped to work out a situation which could be handled successfully in no other way."

The report says that the close working relations which prevailed during the year between the Traction Conference Board and the company helped materially in the operations of the property. During the last twelve months seven municipalities entered this quasi-partnership agreement, so that at the close of the year 73 per cent of the total population served and approximately 75 per cent of the total paved track mileage operated came under this agreement.

No definite plan has been evolved for readjustment and improvement of the financial structure of the railway system as a whole, but studies are progressing towards a solution of this complex problem.

During the year, 32.6 miles of track was reconstructed and 4.77 unused miles was abandoned. The report says:

The personnel is interested and its

STATISTICS OF THE PITTSBURGH RAILWAYS

Miles of road	327.25
Miles of track	585.99
Carhouses operated	20
Car shops	1
Trainmen's quarters and administration buildings	12
Rolling Stock:	
Passenger cars—motor	1,207
Passenger trailers—motorized	81
Passenger trailers—non-motorized	144
Freight cars	9
Snow sweepers	39
Snow plow	1
Snow scrapers	17
Sand cars	27
Flat cars	65
Work cars, etc.	74
Total cars	1,664

Passengers Carried:	
Revenue	262,061,272
Free transfer	38,243,105
Free	919,723
	301,224,100

Passengers carried (revenue, free transfer, free and estimated extra rides on passes)	389,615,236
Car-miles operated	41,588,216
Car-hours operated	5,045,323
Passenger revenue per revenue car-mile, cents	50.51
Average fare per revenue passenger, cents	7.97
Average fare per passenger (revenue, free transfer and free), cents	6.94
Average fare per car ride (total passengers carried), cents	5.36

morale high. The management is committed to scientific research and progressive methods. These factors, combined with good public relations, present a promising outlook and the management is pledged to continue efforts to render more and better service to patrons and create a progressively better situation for car riders and investors.

\$2,496,769 Paid to Chicago by Surface Lines

Payments aggregating \$2,496,769 and representing 55 per cent of the 1927 net receipts were made on April 11 to the Chicago City Council traction fund by the Chicago Surface Lines under the terms of the original 1907 ordinance. Of this total, the Chicago Railways, now operated by federal receivers, paid \$1,562,714 and the Chicago City Railway and subsidiary lines, \$934,055. The payments were made as the result of the extension on March 30 of the Surface Lines franchises for the fourteenth time since the twenty-year grants expired a year ago last January. The present extension, like the six previous ones, is for a 30-day period.

Sunday Pass Record in St. Louis

The St. Louis Public Service Company, St. Louis, Mo., on Sunday, April 8, sold 43,000 unlimited-ride tickets at 25 cents each. The passes were good between 3 a.m., Sunday and 3 a.m., Monday. This set a new record for the company.

Six Lines Continued in Portland on Reduced Schedule

After a study of the evidence by the Public Utilities Commission and officials of the Portland Street Railway, Portland, Me., operated under lease by the Cumberland County Power & Light Company, it was decided to continue the operation of cars on six of the seven lines on the reduced schedule plan. A month's trial has been ordered by the commission until May 15. In this way it is hoped to reduce the losses sufficiently so as to maintain service. The other line of the seven petitioned for abandonment—the Spring Street line—will be supplanted by bus service. If the plan does not succeed the commission will continue the hearings after May 15, when it will be settled that the lines are either to be discontinued or supplanted by another type of service.

At the hearing Manager Fred D. Gordon cited instances of decreased revenues, mounting costs of operation and construction, even with higher tariff. The deficit in 1927 was \$171,000. The suggestion of higher fares was rejected.

F. W. Hinckley, Republican candidate for nomination as Governor, said that since the Cumberland company was operating the lines under lease it had no legal right to seek to put into effect a plan that might tend to destroy property rights or franchise values.

Kansas Line Would Issue Bonds

An application has been filed by the Kansas City, Merriam & Shawnee Electric Railway with the Kansas Public Service Commission for permission to issue \$35,000 in first mortgage bonds and 2,000 shares of preferred stock with a value of \$10 a share. The purpose is to provide funds to construct an electric line from Southwest Boulevard, Kansas City, Kan., to Rose Hill in Johnson County. At the same time Herman Sonken applied to sell to the company a right-of-way owned by the old Kansas City, Lawrence & Topeka Railway for some years.

Question of Inter-Company Charges Settled in Dallas

Surplus reserves of the Dallas Railway & Terminal Company, Dallas, Tex., have been swelled to a total of more than \$583,000 by action of the directors of the Dallas Power & Light Company in restoring about \$240,000 in overpayments of power bills by the railway. They cover a period of several years and result from the agreement by the power company to a basis of rate charges to the railway which the city insists is the correct one. Both the action of the railway directors and the power company directors comply with request made by John W. Everman, the supervisor of the city public utilities, during and previous to the recent public hearing on the application for higher car fares.

Action just taken came after extended conferences between Mr. Everman and officials of the affected companies. C. E. Calder, president, and C. W. Davis, vice-president and general manager of the Dallas Power & Light Company, were credited with working out the details.

\$1,444,330 Award to Fonda Road Upheld

The award by the Hudson River Regulating District Commission of \$1,444,330 for the Fonda, Johnstown & Gloversville Railroad right-of-way in the Sacandaga Valley has been upheld unanimously in a decision of the Appellate Division, third department. The decision removes the last legal barrier to the huge project which is to impound a lake 25 miles long and 5 miles wide as a storage for the Hudson River watershed, unless the Appellate Division consents to permit the railroad to take an appeal to the Court of Appeals.

The railroad had asked \$4,500,000 for its property and the Hudson River Regulating District Commission had offered \$550,000 before the commission made its survey. The price actually paid for it, \$1,440,330, was held as fair by Justice Whitmyer, who directed the commission to resume work in the area.

The court held in short that the Hudson River Regulatory Commission's work is both constitutional and necessary as a health measure for the protection of the inhabitants of the Capitol

district and that because power is to be incidentally developed by impounding water and building dams it is not a private enterprise even though 95 per cent of the project is financed by private corporations, because public good is being served and the use of all of the resultant power is subject to regulation by the state for the public good.

Texas Line Sold

Sale of the railway system of the Wichita Falls Traction Company in Wichita Falls, Tex., is announced by Frank Kell, president of the company. The purchaser is A. P. Barrett, Fort Worth, the head of electric power interests in Texas. The consideration was not announced, but officials said that assets of the company total over \$500,000. The line covers 17 miles.

A. P. Barrett will succeed Mr. Kell as president and the latter will be chairman of the board of directors. Other officers of the company will be L. L. Albeiton, vice-president and general manager; A. L. McNab, treasurer; and William N. Bonner, general attorney.

Capital Increase Before Philadelphia Stockholders

A special meeting of stockholders of the Philadelphia Rapid Transit Company, Philadelphia, Pa., will be held on June 18 to vote on increasing the preferred stock \$5,000,000 to \$35,000,000, making total authorized capitalization \$65,000,000 of which \$30,000,000 is common stock.

Title has been taken by the Mitten Bank Securities Corporation, Philadelphia, Pa., from G. H. Daley to the 13-acre plant of the Commercial Truck Company at the southwest corner of Hunting Park Avenue and American Street for a price of \$500,000, of which \$300,000 remained on mortgage. The property has been leased to the Philadelphia Rural Transit Company, a subsidiary of the Philadelphia Rapid Transit Company, to be occupied by shops in connection with the operation of its buses. The Philadelphia Rapid Transit Company has conveyed to the Motor Real Estate Company the car-house property at the southeast corner of 27th Street and Allegheny Avenue, assessed at \$200,000.

Canadian Border Cars Still Run at Loss

Gross operating revenue of the Hydro Electric Railways, Windsor, Ont., operating in the so-called border cities, was \$1,069,631 last year, as against operating expenditures of \$1,089,611. On the other hand, the gross revenue for the last fiscal period was substantially higher than during the 1926 season, the figures being cited as \$1,031,443 for 1926, compared with \$1,069,631 for 1927. Likewise, 18,928,737 passengers were carried last year compared with 18,410,520 in 1926, or an increase of 518,217.

Dividend on Eastern Massachusetts Common in 1929

Since March 12, the day on which Public Trustee Arthur G. Wadleigh of the Eastern Massachusetts Street Railway expressed the opinion that common dividends would be started in 1929, the stock issues of the road have advanced five to ten points on the Boston Stock Exchange. To the highs they are up as follows: First preferred, 74 to 84½; preferred B, 70½ to 79½; adjustment, 53 to 62; common, 30½ to 41½.

For the 1927 calendar year the public trustees reported net earnings after all deductions of \$772,060 and paid preferred and adjustment stock dividends of \$866,201, making it necessary to draw upon surplus to the extent of \$94,141. Last year there was a charge against income of \$276,000 for amortization of obsolete equipment account, which charge has since been eliminated inasmuch as the account has been entirely amortized. Had this charge not been in effect last year the road would have had \$1,048,060 available for dividends, equal after all the senior stock dividends to \$2.13 a share on the 85,254 shares of common.

Another factor tending to enlarge the earnings applicable to the common is the reduction of funded debt. As bonds mature and are paid off the interest charge is reduced. Naturally the interest saving is greater than the interest loss on the cash or investment securities used to retire the maturing debt.

Mr. Wadleigh felt that dividends would not be initiated at \$6 a share on the common stock, but at a rate that would be "a very good return on its present market value." As the market value of the stock at that time was about \$30 a share, presumably a dividend of \$2 to \$3 a share would be regarded as a very good return.—Barron's

Earnings of Ohio Road Impounded

Judge Frank M. Krapp in Common Pleas Court has ordered Willits H. Sawyer, receiver of the Springfield Railway, Springfield, Ohio, to impound all receipts for the benefit and protection of the Real Estate, Land Title & Trust Company, Philadelphia, trustee under the indenture securing outstanding bonds. The trustee asserted in its application that the railway had defaulted in the payment of bond interest. The ruling by the court precludes the receiver from paying out any funds except those necessary for the actual operation of the railway and the expenses of the receivership.

Would Discontinue Short Kansas Interurban

The United Power & Light Corporation, Abilene, Kan., applied to the State Public Service Commission recently for permission to discontinue its electric interurban line between Junction City and Fort Riley.

Personal Items

C. A. Brooks Honored at Dinner

Friends of C. A. Brooks, who shapes the destinies of railway properties owned by the National Electric Power Company, honored him at a testimonial dinner in the Commodore Hotel, New York, on the evening of April 16.

W. G. Gove, superintendent of the Brooklyn-Manhattan Transit Corporation, acted as toastmaster. The speakers were J. S. McWhirter, Joseph K. Choate, Silas Hinckley and Harry Reid. All of the speakers, including Chairman Gove, were railway executives with whom Mr. Brooks has formerly been associated, while Mr. Reid is president of the company with which Mr. Brooks is now connected. Thus, as these men reminisced they outlined the entire experience of their guest in the railway business.

Mr. Brooks joined the forces of the National Electric Power Company when that organization acquired railway properties formerly controlled by A. E. Fitkin Company. He had been general manager of the Poughkeepsie & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., to which property he went in April, 1913, after having served as a member of the J. G. White staff in New York. He left Poughkeepsie in March, 1925, to join the Fitkin organization.

Back in 1902 Mr. Brooks entered the transportation business with the Brooklyn Rapid Transit Company. Later he was with Sanderson & Porter for a short period, but left their employ to enter the service of the Third Avenue Railroad, New York. Following that he directed the construction of the so-called South Shore railway lines in Long Island and in 1912 joined the staff of the White organization.

Members of Montreal Commission Re-Named

J. F. Saint-Cyr, chairman of the Montreal Tramways Commission, and J. S. Archibald, member of the same commission, have been reappointed by provincial order-in-council to the same positions for a further period of ten years.

Both these members were named to the commission when it was originated in 1918. The third member of the commission is Paul Beique, appointed in 1926, upon the death of L. A. Herdt, the third original member of the commission.

The Montreal Tramways Commission is the governing body as to tramways matters in Montreal, controlling the Montreal Tramways in all matters of expenditure for capital purposes, and also controlling other expenditure. Appeal lies in the Quebec Public Service Commission only in certain matters, notably, as to what is to constitute

capital expenditure, since the company is allowed 6 per cent on all such expenditure.

Mr. Saint-Cyr left the provincial criminal bench in 1918 to take the chairmanship of the Tramways Commission. He had sat in the Court of Sessions for two years up to that time, but previously had been judge at St. Johns. He devotes all his time to the commission.

Mr. Archibald is a well-known architect. He recently built several schools, the forum on St. Catherine Street, and was one of the consulting architects for the new court house.

Mr. Beique is a civil engineer, as was his predecessor, Dr. Herdt.

The city of Montreal is a partner in the tramways contract, and it is as representative of the city that the commission acts.

New Honor for H. B. Potter

H. B. Potter, general manager of the United Railways & Electric Company, Baltimore, Md., since 1925, was elected a vice-president at the annual meeting held on April 11. "Bert" Potter is well known in railway circles especially for his activities in Maine and Massachusetts. It was from the Boston Elevated Railway, where he had served as assistant general manager under Edward Dana and previously as assistant to Matthew C. Brush, that he went in 1923 to Baltimore as assistant to the president of the United Railways & Electric Company. Before going to Boston where his legislative, operative and safety work, covering a period of thirteen years were especially commendable, he had been identified with the building and operation of electric railways in Maine.

Mr. Potter was born in Providence, R. I., on Nov. 14, 1881. He was educated in the public schools of Cambridge, Mass., and at Lowell Institute, from which he was graduated in electrical and mechanical engineering.

WARREN VIESSMAN, an engineer formerly with the United Railways & Electric Company, Baltimore, Md., has been appointed head of the Bureau of Mechanical-Electrical Service, one of the divisions of Baltimore's Department of Public Works. In addition to being with the United Railways & Electric Mr. Viessman has been associated with the Westinghouse Company, the Consolidated Gas, Electric Light & Power Company and the Union Shipbuilding Company. His most recent position was with the Consolidated. He is engineering officer in the United States Naval Reserve. He was graduated from the Baltimore Polytechnic Institute and the engineering department of Johns Hopkins University.

C. E. Bostwick at Savannah

Charles E. Bostwick, for six years superintendent of the Jacksonville Traction Company, Jacksonville, Fla., and more recently manager of the White Star Stage Line at Tampa, organized to take over bus properties reported to have been purchased by Stone & Webster, has been assigned to the Savannah Electric & Power Company.

R. J. O'Brien in New Rôle with Westinghouse

R. J. O'Brien has been appointed assistant to the transportation sales manager of the Westinghouse Electric & Manufacturing Company, having the Atlantic seaboard district as his territory. Since April, 1920, Mr. O'Brien has been on the staff of F. H. Shepard, director of heavy traction of the Westinghouse Company, and has been the Westinghouse representative on the Virginian electrification. Mr. Shepard's staff more recently has been engaged in self-propelled car work.

After he was graduated from the University of Minnesota, Mr. O'Brien was made resident engineer of the Great Northern Railway at New Rockford, N. D., and had charge of the construction of 10 miles of main line railroad and the new engine division terminal. Following this, for approximately a year and a half, Mr. O'Brien was an apprentice at the Westinghouse plant at East Pittsburgh, later being assigned to railway engineering.

From 1913 to 1917 he was engaged in general engineering work for Gibbs & Hill, consulting engineers. His work was principally in financial and engineering estimates, plans and the supervision of steam railroad electrifications. He was the engineering supervisor of the electrical features of the Pennsylvania Railroad on the Philadelphia-Paoli-Chestnut Hill electrification and was in charge of electrical tests of the Norfolk & Western electrification. From 1917 to 1920 Mr. O'Brien was an officer of the A.E.F.

Obituary

GEORGE PARTRIDGE BULLARD, chairman of the Board of Public Trustees of the Eastern Massachusetts Street Railway, Boston, Mass., since late in 1925, died suddenly on April 17. He had served on the board since 1924, when he was appointed by Governor Channing Cox. In 1901 and 1902 he was a member of the Massachusetts Legislature, serving as chairman of the House committee on railroads. At the time of his death Mr. Bullard was president of the West Newton Savings Bank. He was 71 years old.

CHARLES FORBES, connected with the freight department of the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., died recently at his home in Connersville. He was 53 years old.

Paris May Get Danville Line

Paris, Ill., has hopes that the proposed railway connection between Danville and Indianapolis may be so arranged as to serve it, thus eliminating the necessity of building a new bridge over the Wabash and reducing new track construction to less than 13 miles.

Paris, already served by railway from Terre Haute, proposes that the city street line in Paris—for which there no longer are any cars—be donated to the railway companies, and that the tracks be extended by the railway people from Paris to Ridgefarm, there to link up with the present Danville-Ridgefarm service of the Illinois Traction Company.

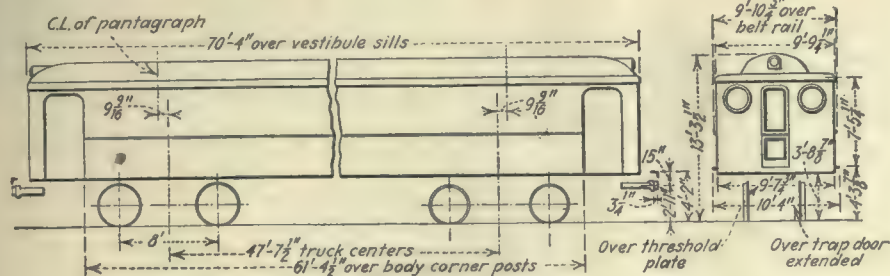
From Danville to Indianapolis via Paris and Terre Haute would be, roughly, 30 to 35 miles farther than would the Indianapolis route via Crawfordsville.

Twenty Cars Being Constructed for N. Y., W. & B. Ry.

Construction of the twenty new cars for the New York, Westchester & Boston Railway, New York, is under way in the plant of the Osgood Bradley Car Company, Worcester, Mass. These cars are of the all-steel type made up of unit side frame, Stillwell design. The 11,000-volt single-phase trolley feeds through one of two pantographs through high tension leads to the transformer. The

voltage is then stepped down for use on motors and auxiliary circuits.

These cars, for heavy suburban service, are 72 ft. 7½-in. long and 9 ft. 10½-in. wide. The car body weighs approximately 63,200 lb. and the total weight of the car is about 124,830 lb. The detailed features of the cars, are given in the accompanying specifications and plans.



General dimensions of the twenty cars being built for the New York, Westchester & Boston Railways by the Osgood Bradley Car Company

Name of Railway	New York, Westchester & Boston
City and State	New York City
Number of units	20
Type of unit	Motor, passenger, suburban, double end, double truck
Number of seats	80
Builder of car body	Osgood Bradley Car Company
City and state	Worcester, Mass.
Date of order	12/14/27
Date of delivery	1st del. 5 mos. after date of contract
Approx weights:	
Car body	63,200 lb.
Motor	16,585 lb.
Trucks	14,738 lb.
Trailer	14,738 lb.
Air	5,572 lb.
Equipment	10,905 lb.
Total elec. mot.	13,830 lb.
Booster centers	47 ft. 7½ in.
Length over all	72 ft. 7½ in.
Length over body posts	61 ft. 4½ in.
Truck wheelbase	8 ft. 0 in.
Width over all	9 ft. 10½ in.
Height, rail to trolley base	13 ft. 3½ in.
Window post spacing	2 ft. 8-13/16 in.
Body	All-steel
Roof	Steel
Doors	Center and end sliding
Air brakes	Westinghouse-AMUE
Armature bearings	Plain
Axles	5½x10, M.C.B.
Car signal system	Westinghouse
Compressors	Westinghouse XD2EG
Conduit	Metal
Control	Westinghouse AB, 32 volts
Couplers	Pitt, 9 in. face

Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote No. 85
Destination signs	Morton Manufacturing Company
Door mechanism	National Pneumatic Company, type GS-8EVP
Energy saving device	Watthour meter
Finish	Enamel
Floor covering	Tucolith
Gears and pinions	Nuttall BP
Glass	Plate
Hand brakes	H. B. Blackall
Hand straps	Bisco Steelkar No. 12
Heat insulating material	3 ply Salamander and Turock
Heaters	No. 405-E
Headlights	Golden Glow, 14 in.
Headlining	Agasote
Interior trim	Agasote and steel
Journal bearings	Plain
Journal boxes	Symington A.R.A.
Lamp fixtures	Safety
Motors	2 Westinghouse 409B, outside hung
Painting scheme	Green, white ceiling
Pantagraph	Nuttall No. 131-A
Roof material	Steel
Safety car devices	Deadman's Automatic Airbrake
Sash fixtures	O. M. Edwards
Seats	Hale & Kilburn Company
Seat spacing	2 ft. 8-13/16 in.
Seating material	Pantasote No. 85
Slack adjusters	American Steel Foundries & Westinghouse
Steps	Stationary
Step treads	Kaas
Trucks	Built up, Stillwell design
Ventilators	Utility
Wheels	Rolled steel-tire diameter 36 and 42 in.

Exhibitograph No. 5

Intending Exhibitors Should Answer All Questions

on

The Exhibit Space Application

for the

A.E.R.A. Convention

Unanswered Questions Mean Delay

CO-OPERATE WITH THE EXHIBIT COMMITTEE

G.E. Orders Increase

Orders received by the General Electric Company for the first three months of the present year amounted to \$79,925,840, compared with \$77,550,581 for the corresponding quarter in 1927 and with \$86,433,658 for the first quarter of 1926. This represents an increase of 3 per cent for the first quarter of 1928 over the corresponding period of 1927.

N.E.M.A. Indorses Principles of Business Conduct

The board of governors of the National Electrical Manufacturers Association has indorsed the "Principles of Business Conduct" which is the result of a study of many codes of ethics that have been adopted by many lines of business, supplemented by suggestions from the membership.

The name, "Principles of Business Conduct," and the first section, designated "General Principles" was adopted in toto from the code developed and adopted by the Chamber of Commerce of the United States.

The second section deals with competitive bidding and is given in full as follows:

1. The electrical manufacturers indorse the principle of a one-price policy.

2. A request for competitive prices on the part of a buyer involves definite obligations toward all bidders. The electrical manufacturers indorse as in the interest of sound, ethical and economic relations between buyer and seller the following principles to apply to competitive bidding under any specific inquiry: (a) That the bids be considered as confidential information between buyer and bidder until all bids are in and the buyer has placed the business. (b) That bidders exchange where practicable full information regarding their bids after the business is placed.

3. Where specifications call for various items involving different types and classes of apparatus, the relative merit of the different bids is best determined and freedom of choice on the part of the buyer promoted if each bidder quotes segregated prices at which any individual item would be accepted.

The succeeding sections deal with the relations of manufacturers to customers, agents or others and the relation of manufacturers to each other.

ROLLING STOCK

Boston & Worcester Street Railway, Framingham, Mass., has added to its fleet of fifteen Macks, two additional Macks of four-cylinder, parlor-car chassis, 25-passenger capacity, with Lang bodies.

BOSTON, REVERE BEACH & LYNN RAILROAD, Boston, Mass., placed an order for a 29-passenger A.C.F. de luxe urban coach.

INTERSTATE STREET RAILWAY, Attleboro, Mass., bought two 27-passenger A.C.F. parlor coaches.

ELECTRIC RAILWAY MATERIAL PRICES—APRIL 17, 1928

Metals—New York

Copper, electrolytic, cents per lb.	13.9625
Lead, cents per lb.	6.10
Nickel, cents per lb.	35.00
Zinc, cents per lb.	6.10
Tin, Straits, cents per lb.	52.75
Aluminum, 98 or 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade.	57.00
General service.	31.50

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons.	4.15
Somerset mine run, f.o.b. mines, net tons.	1.875
Pittsburgh mine run, Pittsburgh, net tons.	1.975
Franklin, Ill., screenings, Chicago.	1.825
Central, Ill., screenings, Chicago.	1.675
Kansas screenings, Kansas City.	2.375

Track Materials—Pittsburgh

Standard steel rails, gross ton.	\$43.00
Railroad spikes, drive, $\frac{1}{2}$ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.80
Steel bars, cents per lb.	1.875
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	\$1.40

Hardware—Pittsburgh

Wire nails, base per keg.	2.65
Sheet iron (24 gage), cents per lb.	2.85
Sheet iron, galvanized (24 gage), cents per lb.	3.70
Galvanized barbed wire, cents per lb.	3.35
Galvanized wire, ordinary, cents per lb.	3.10

Waste—New York

Waste, wool, cents per lb.	16-20
Waste, cotton (100 lb. bale), cents per lb.:	
White.	16-19.50
Colored.	11-16

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	10.2
White lead in oil (100 lb. keg), cents per lb.	13.25
Turpentine (bbl. lots), per gal.	\$0.625
Putty, 100 lb. tins, cents per lb.	5.50

Wire—New York

Copper wire, cents per lb.	16.00
Rubber-covered wire, No. 14, per 1,000 ft.	5.30
Weatherproof wire base, cents per lb.	16.5125

Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand.	\$150
Wood block paving 3 $\frac{1}{2}$ x 8 $\frac{1}{2}$ x 4, N. Y., per 1,000 in carload lots, f.o.b.	\$2.70
Paving brick 3 $\frac{1}{2}$ x 8 $\frac{1}{2}$ x 4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Crushed stone, 1-in., carload lots, N. Y., per cu. yd., delivered.	45.00
Cement, Chicago consumers' net prices, without bags, f.o.b.	3.00
Gravel, 1-in., cu. yd., delivered.	2.05
Sand, cu. yd., delivered.	2.80
	2.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	11.625
Light copper, cents per lb.	10.125
Heavy yellow brass, cents per lb.	7.125
Zinc, old scrap, cents per lb.	3.125
Lead, cents per lb. (heavy)	4.875
Steel car axles, Chicago, net ton.	\$16.25
Cast iron car wheels, Chicago, gross ton.	13.75
Rails (short), Chicago, gross ton.	15.25
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton.	7.25

J. H. WILLIAMS & COMPANY, Buffalo, N. Y., and the HUSKY WRENCH COMPANY, Milwaukee, Wis., have joined in a working arrangement whereby they can offer a complete line of combination wrench sets. This combination is made for selling purposes only and does not effect the financial structure or management of either company.

LEW WEISENBURGER, sales representative for the Hale & Kilburn Company, whose headquarters are at Chicago, has submitted his resignation, to take effect April 30. Mr. Weisenburger's activities for the past three years have been in the electric and bus fields in the central and western territory. Prior to this he was at the Hale & Kilburn Philadelphia factory.

C. H. WILL MOTORS CORPORATION, Minneapolis, Minn., has tripled its business this spring. The output is now one \$12,000 bus a day. Capitalization has just been increased from \$50,000 to \$750,000, the payroll has been increased from about \$95,000 to \$190,000 a year and the force from 60 to 125 men.

HYATT ROLLER BEARING COMPANY, Newark, N. J., has appointed as chief engineer, O. W. Young, formerly located with the western division sales office. He takes up his new duties at the company headquarters in Newark.

LEEDS, TOZZER & COMPANY, New York, N. Y., has appointed as western sales representative, Wm. McCormick, formerly Pittsburgh sales manager of the Niles Tool Works Company and the Pratt & Whitney Company.

R. D. NUTTALL COMPANY's commercial activities will be handled by and through the parent company, the Westinghouse Electric & Manufacturing Company. All inquiries should be addressed to the nearest Westinghouse district office. J. E. Mullen, formerly assistant sales manager of the R. D. Nuttall Company, will head the new commercial set-up with offices at the Nuttall plant, McCandless Avenue at Butler Street, Pittsburgh, Pa.

ADVERTISING LITERATURE

CONSOLIDATED CAR HEATING COMPANY, Albany, N. Y., describes its new motor resistor heater, sheath wire heaters, automatic treadle-operated door control, car buzzers, visible thermostats and safety switches in an advertising folder recently issued.

PEREY MANUFACTURING COMPANY, New York, N. Y., has issued a folder entitled, "Stop the Revenue Leaks," dealing with the use of turnstiles in recording revenue.

SUPERHEATER COMPANY, New York, N. Y., has published a booklet on the word "Elesco-operation" which gives facts about Elesco superheaters for power plants and industrial use.

INTERNATIONAL HARVESTER COMPANY, Chicago, Ill., has published a booklet entitled "Automotive Equipment for Railroads."

CHESTNUT RIDGE TRANSPORTATION COMPANY, Derry, Pa., has ordered two 21-passenger A.C.F. parlor coaches.

CLEVELAND RAILWAY, Cleveland, Ohio, has ordered 49 one-man-two-man cars from Kuhlman Car Company. The cars are to be of the Peter Witt design and each car will have two treadle doors in the center.

NEW ENGLAND TRANSPORTATION COMPANY, a subsidiary of the New York, New Haven & Hartford Railroad, South Station, Boston, Mass., has received six Mack four-cylinder 230-in. chassis with Brown bodies.

BOSTON & MAINE RAILROAD, Boston, Mass., purchased five A.C.F. 29-passenger parlor observation coaches.

CITIZENS TRACTION COMPANY, Oil City, Pa., has ordered from the American Car & Foundry Company, ten series 602 23-passenger buses.

MONONGAHELA WEST PENN PUBLIC SERVICE COMPANY, Fairmont, W. Va., is rumored to have placed an order with The G. C. Kuhlman Car Company, Cleveland, Ohio, for ten cars.

INTERNATIONAL RAILWAY, Buffalo, N. Y., is rebuilding eighteen double-end, double-truck cars. They are to be equipped with air brake and safety car control devices, and each car is to have selective door operation.

LACKAWANNA & WYOMING VALLEY RAILROAD, Scranton, Pa., is reported to have ordered four 75,000-lb. interurban type cars from Osgood Bradley Car Company, Worcester, Mass.

TRACK AND LINE

INTERNATIONAL RAILWAY, Buffalo, N. Y., announces that track reconstruction and repaving involving an aggregate expenditure of \$375,000 will be undertaken this year. The track reconstruction program covers a total distance of 4 miles divided between thirteen widely scattered sections of the city. The reconstruction work will start July 1.

LOS ANGELES RAILWAY, Los Angeles, Cal., is removing track on Vermont Avenue between Ninth and Tenth Streets preparatory to the cutting down of the grade.

READING TRANSIT COMPANY, Reading, Pa., will install a double-track branch-off and make other track changes at a total cost of approximately \$6,000.

SHOPS AND BUILDINGS

TWIN CITY MOTOR BUS COMPANY, Minneapolis, Minn., has let the contract for a \$50,000 addition to its Minneapolis garage to be put under way May 1. The addition will be 120x140 ft., one-story brick construction. It is being built because of need of space for new buses bought during the year.

TRADE NOTES

GRISWOLD SAFETY SIGNAL COMPANY, Minneapolis, Minn., will expand its business by erecting a one and two-story \$50,000 building at Linden Avenue and Seventeenth Street, and increasing its capitalization from \$250,000 to \$1,000,000, and adding railroad grade crossing warning signals. The company was organized in 1923 by Frank W. Griswold and manufactures "stop" and "go" automatic signals and "slow" warning posts.



Perfect

Yes, 100% *perfect* control of cars is maintained at all times if equipped with "Peacock" Staffless Brakes.

The stop will be sure—certain—graduated—*perfect*. There is no doubt about their action—no failure.

It occupies about half the space, weighs less and gives three or four times the braking power of the ordinary hand brake.

Riding behind a "Peacock" is to ride with safety.

Specify it on your new cars and cars to be rebuilt.



The
"Peacock"
Staffless

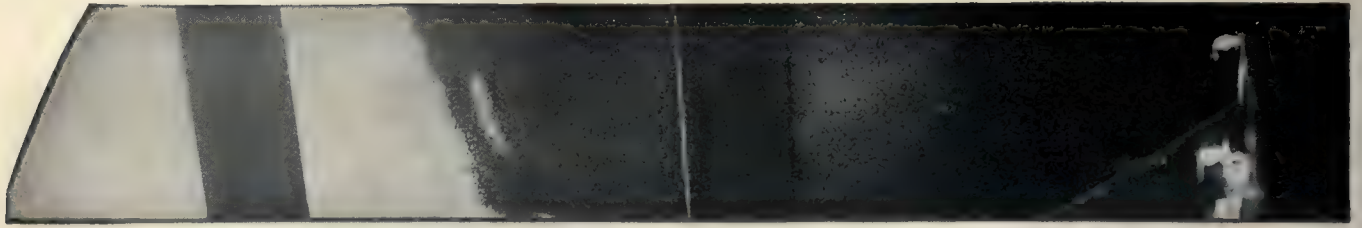
National Brake Company, Inc.

890 Ellicott Square

Buffalo, N. Y.

Canadian Representative

Lyman Tube & Supply Co., Ltd., Montreal, Can.



GENERAL'S success in tackling the toughest jobs has been the result of General's experience in supplying the big share of the truck and bus tire market. Applying factory experience to dealer service has always been the policy of General. The General dealer knows how to properly fit the tire to the job because he is familiar with the tire engineering problems that every operator faces.

THE GENERAL TIRE AND RUBBER COMPANY, AKRON, OHIO



The Mark
of Leading
Tire Stores
Everywhere



The

GENERAL TIRE

—goes a long way to make friends

The Heavy Express Special

Specially built to stand up under the load at express speed, the Heavy Express Special carries through on any job. Operators everywhere are swinging to it.

*Luxury
Economy
Sturdiness*
Fitz John



Observation Type that Pulls Patronage

The luxurious, comforting look of this bus is an invitation to travel.

It bespeaks riding joy—arrival rested and refreshed.

Of course it's a FITZJOHN Body—our 21-Passenger Observation Type.

It is as good as it looks—perfectly appointed—splendidly designed—sturdily built for long, profitable life.

Grille, canopy and other decorative features are of the finest type.

You know how inviting, appealing looks help business, also how sturdy construction cuts costs.

Send for more information on this body.

FITZJOHN Manufacturing Company

Exclusive Bus Body Builders

MUSKEGON, MICHIGAN



One of the 100% Goodyear-equipped fleet of the Portland Electric Power Company, Portland, Oregon

GOODYEAR

Copyright 1928, by The Goodyear Tire & Rubber Co., Inc.

GOODYEAR... one hundred per cent!

The number of bus lines that are equipped exclusively with Goodyear Pneumatic Cord Bus Tires is growing steadily.

As one operator after another gets through with tests and trials and experiments, the records of dependable, low-cost tire performance point to Goodyear—*one hundred per cent!*

A typical example of this complete reliance on Goodyear is supplied by the Portland Electric Power Company, of Portland, Oregon.

"We are pleased to state that we have used Goodyear Tires and service on our buses since October, 1924, with excellent results," writes Mr. Thomas Pumfrey, Chief Engineer of Railways, "and our fleet of 41 buses is now equipped 100% with Goodyear Tires.

"They all have dual tires on the rear wheels, and the buses average 120,000 miles per month, carrying 448,000 passengers. Our average between tire failures has been 25,026 miles.

"Goodyear Service has been very satisfactory, and we have found Goodyear Sales and Service organization very fair."

Goodyear Pneumatic Bus Tires deliver their superior grade of performance because of their special design and construction. They have the All-Weather tread for powerful traction and road-gripping safety in any going. They have the long-lasting strength provided by extra-elastic, extra-durable SUPER-TWIST cord. For uninterrupted revenue mileage at low tire-mile cost, equip 100% with Goodyear.

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service

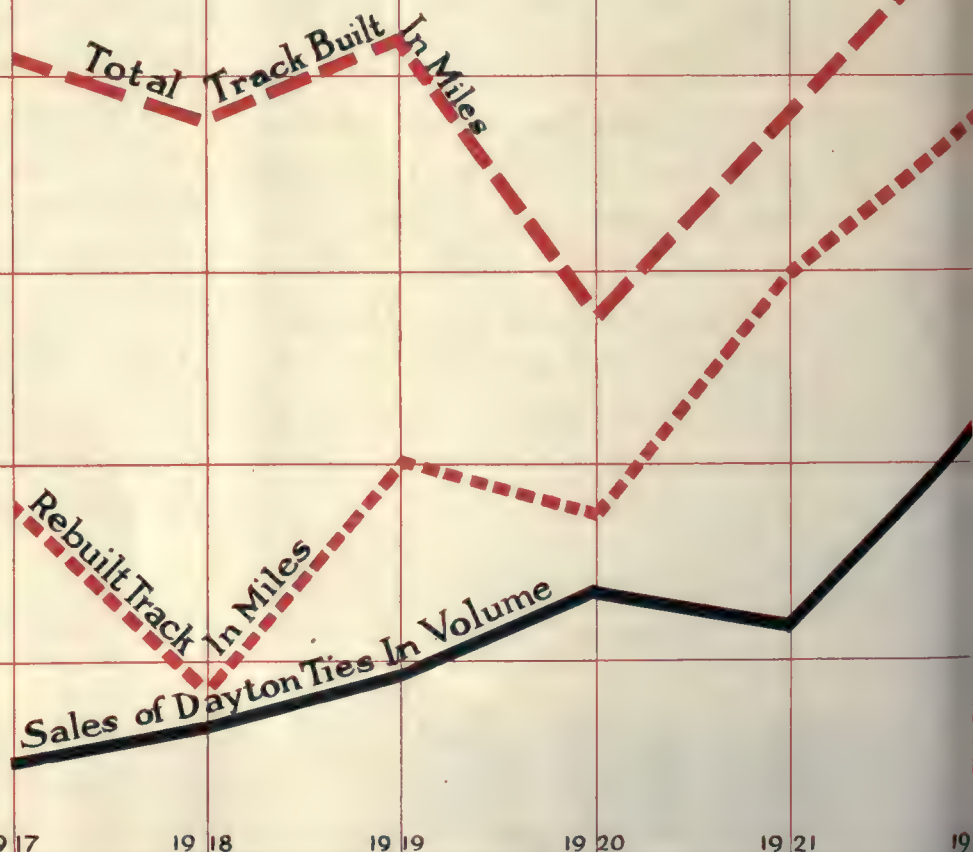
BUS TIRES

The Industry Dayton

The real gauge of recognition is the volume of a manufacturer's product the industry purchases.

The curves shown herewith, compiled from *Electric Railway Journal* records and from our own sales records indicates remarkable gains in the purchases of Dayton Ties over the past 11 years. They give conclusive evidence of a quality product, proved by sound economies.

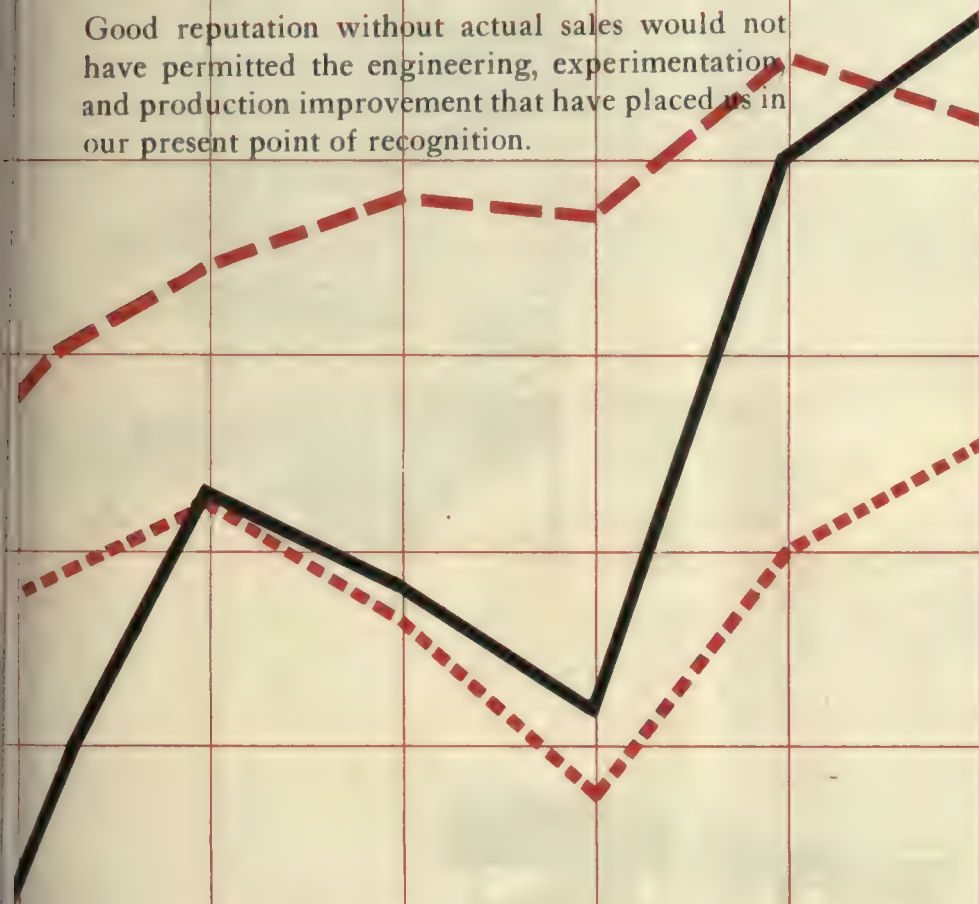
But these remarkable gains would mean little if they merely followed gains in the industry as a whole. They do not. They show that of total ties purchased in any given year, an ever greater proportion are Dayton Ties.



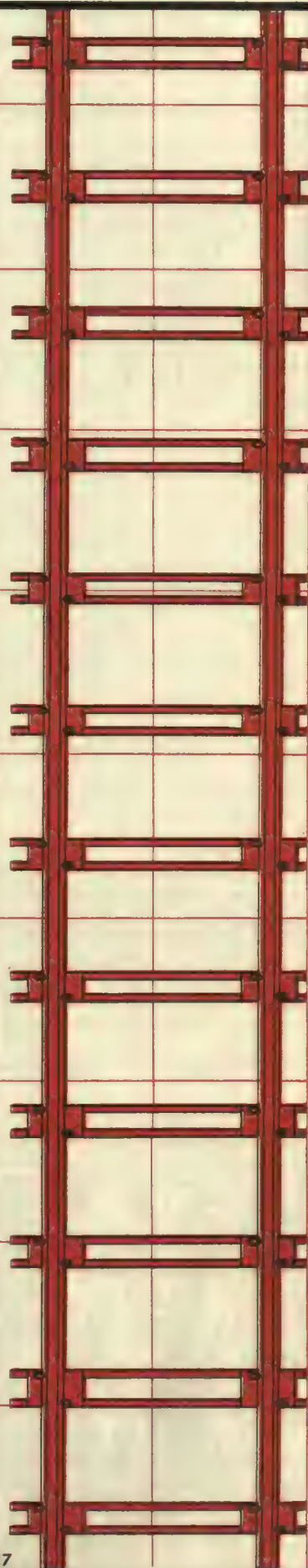
Is Turning to Ties

We have long known that Dayton Ties were well and favorably known in the Electric Railway Industry.

Good reputation without actual sales would not have permitted the engineering, experimentation and production improvement that have placed us in our present point of recognition.



The Dayton Mechanical
Tie Company
DAYTON, OHIO



Prepare for Spring and Summer Traffic

Improved road conditions that may be expected from now on are an aid to bus operators, but increasing traffic constitutes another problem. It brings in its wake intermittent starting and stopping, heavy loads, jammed highways.

Some of these conditions cannot be overcome. But your drivers can be assured of quick starting, smooth and rapid acceleration, and fullness of power by using

RED CROWN Gasoline

in all buses. Red Crown Gasoline is all that a good gasoline should be. It has proved in repeated laboratory and road tests to be the most efficient and economical motor fuel for buses. More of it is being used by bus operators in the Middle West than any other brand.

A representative thoroughly conversant with fuel and lubricating problems as applied to buses will be pleased to make a survey of your equipment, and offer helpful recommendations without obligation to you.

STANDARD OIL COMPANY

(INDIANA)

910 South Michigan Ave.

Chicago, Illinois

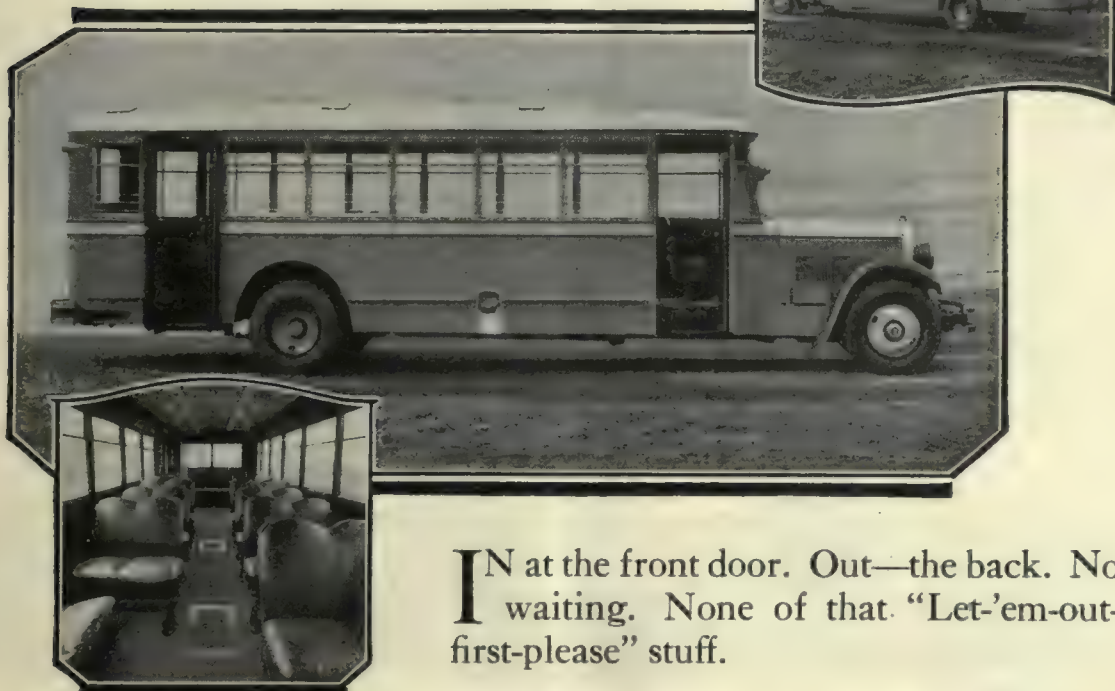


LOADING & UNLOADING

Quick as Closing a Door . . .

THEY'RE IN—THEY'RE OUT—

Just like that!



Door at right front—two-piece Jack-knife type; actuated by National Pneumatic Air Engine. Right rear exit door is double fold or four-piece type—actuated by combination Pneumatic Air Engine with treadle step.

Bus cannot start unless both doors are properly closed. Emergency door at left rear also.

IN at the front door. Out—the back. No waiting. None of that “Let-’em-out-first-please” stuff.

A pay-enter type. Seats 29 passengers. Holds a lot more. Wide comfortable aisle for standees. No stooping for the six-footers.

Seats as restful as a davenport. Windows wide, clear and non-rattling. Plenty of ventilation. Lights non-glaring. Heating O. K.

More information upon request. Write today. Learn more about this profit maker for your business.

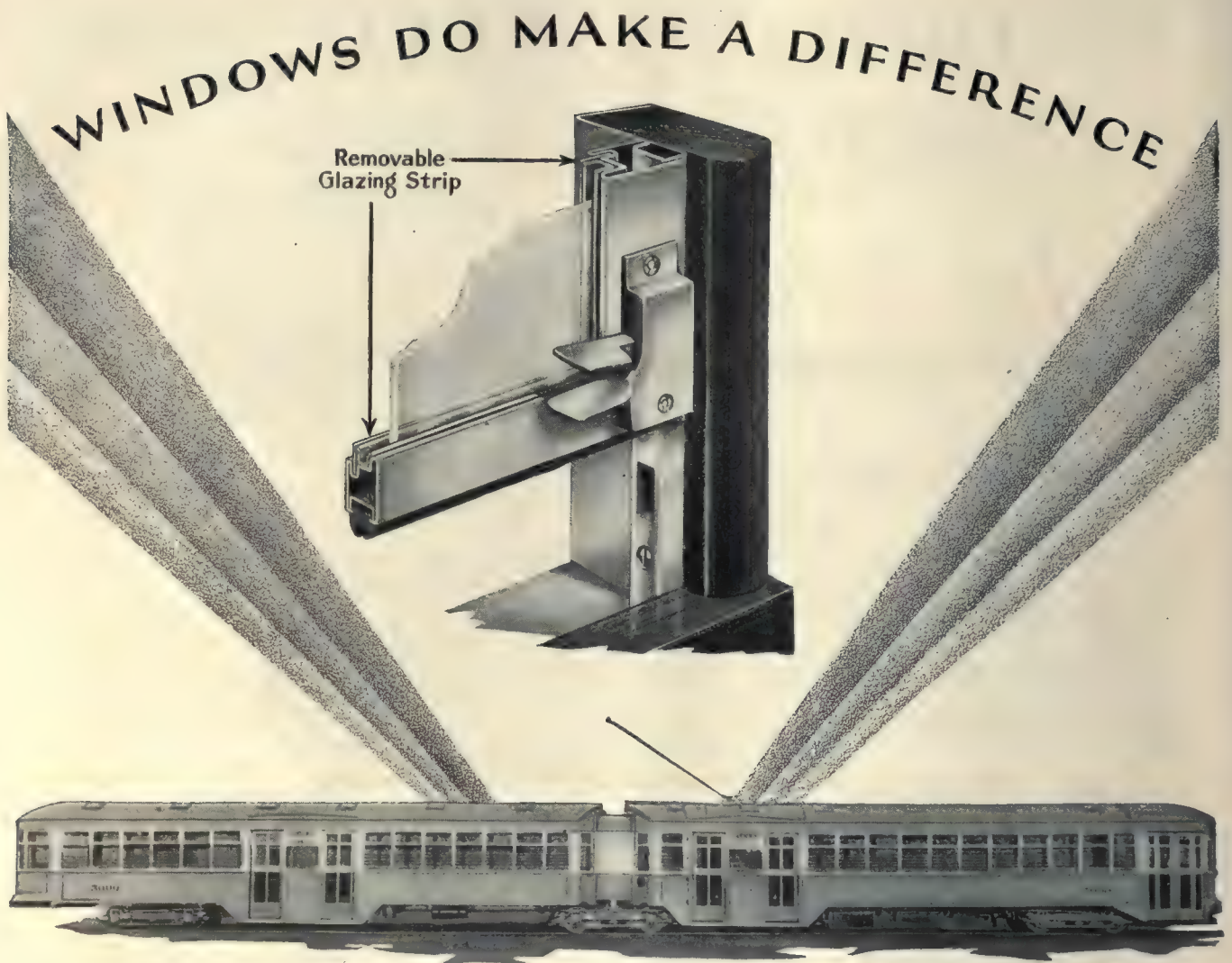
THE BENDER BODY COMPANY

W. 62nd and Denison



Cleveland, Ohio

BENDER BODIES



Broken Glass — can you replace it *at once*?

You cannot avoid broken window glass when your cars or motor coaches are in service. Your glass cost sheets tell the story of necessary replacements.

You *can* avoid car lay-up in the shop... by replacing the glass at once.

With Edwards Metal Sash with Removable Glazing Strips, reglazing can be done in as short a time as two and one-half minutes... without removing sash from opening. It takes only a few seconds to remove the glazing strips. Replace the glass, slide the strips into place,

and the car or motor coach is ready for service. No need to pull it into the shop... no time lost.

This new feature is another proof of Edwards leadership in metal sash design and construction. To electric railway companies it means a saving of many dollars in time and labor.

Write for complete information.

O. M. EDWARDS CO.

New York Syracuse, N. Y. Chicago

Canadian Representatives:

Lyman Tube & Supply Co., Ltd., Montreal
and Toronto

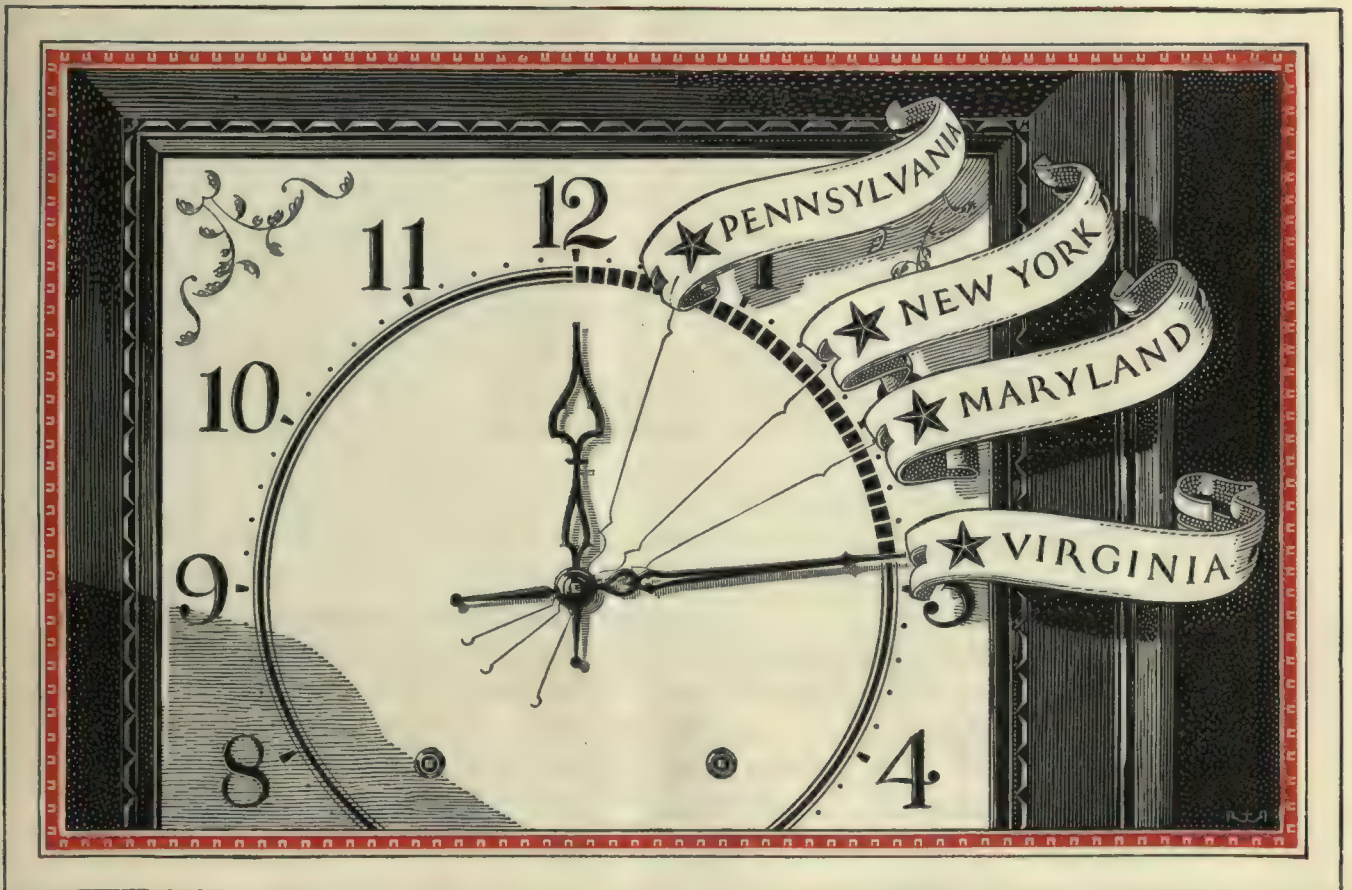
*Illustrated above:
New Cleveland Railway
Co. Articulated Car using
Edwards Metal Sash with
Removable Glazing Strips.*



Edwards Metal Sash

2400 **M**iles

\$1700 worth of **B**usiness in 14 minutes



C *An Advertisement for Bell Long Distance Telephone Service*

A PENNSYLVANIA cement company called by Long Distance and secured a 30-ton order from a town in New York. Telephone charges \$1.95. A 24-ton order from a Maryland town; charges \$2.50. A 20-ton order from a Pennsylvania town; charges 75 cents. And a 15-ton order from a town in Virginia; charges \$3.50. . . . Twenty-four hundred miles were "traveled"—there and back. Total orders secured, \$1700. Total charges, \$8.70. Talking time, 14 minutes.

So many businesses have found Long Distance indispensable in sales work that the "key town" plan has been developed as a further assistance and saving. By this plan key towns are selected. Each one of these is central

to all of the towns in its trade territory. From the key towns in the various territories, the representatives cover the other towns by telephone, in minimum time and at low cost.

To facilitate the use of the key town sales plan, interested firms may arrange for credit identification cards to be issued to their traveling representatives.

Long distance telephone service can be custom-made to fit your business. Surprising how much long distance calls will do and how little they will cost. Ask the nearest Bell business office about the key town plan. . . . Calling by number takes less time. Number, please?



There's a National brush plant near you

DUE to the fact that each brush order is a special job calling for individual manufacturing processes, we have located Branch Offices and Factories in or close to the leading industrial centers of the country. These plants are supplied with stocks of the standard National grades of brush plates, and are equipped to manufacture these plates into finished brushes. Wherever possible, and except on large or special orders, your requirements are filled by the plant nearest you.

Each Branch Factory is under the supervision of factory trained experts, and the brushes produced are, of course, made to the same high standards of quality and workmanship as are those manufactured in the large finishing

plants at our main factories. The Branch Factory System is a great time saver and is especially valuable in cases of emergency when brushes are needed in a hurry.

To take full advantage of these manufacturing and service facilities, it is important to have in the Branch Office nearest you a Data Sheet for each of your electrical machines. On receipt of an order we then find full specifications on our copies of the Data Sheets covering your equipment, and can proceed to fill your order on the written, wired or telephoned advice to supply brushes for any machine or machines in your plant. The Data Sheet System is installed by us, entirely without cost to you.



NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide  and Carbon Corporation

Carbon Sales Division

Cleveland, Ohio



San Francisco, Cal.

Branch Offices and Factories

CHICAGO, ILL.

PITTSBURGH, PA.

JERSEY CITY, N. J.

BIRMINGHAM, ALA.



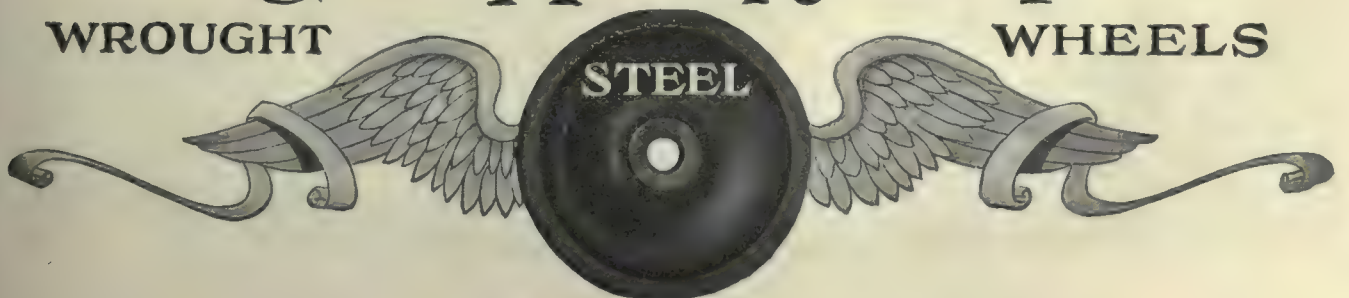
Here We ROLL IN The Mileage Gary Wheels ROLL OUT

WROUGHT STEEL WHEELS are doubly efficient wheels because they combine the advantages of rolling with those of forging. A ten-thousand-ton hydraulic press forges out defects; a remarkably efficient rolling mill rolls in multiplied mileage. In the rolling operation seven powerful rolls act in unison on the rim and web. As the wheel block revolves, a portion of the metal is forced from the web into the rim; tread and flange are formed to proper contour; the width of the rim is accurately controlled while its structure undergoes a refining process that reflects itself in long, steady and low-cost mileage

The co-operation of Gary wheel engineers is at your service.

Illinois Steel Company
General Offices: 208 South La Salle Street
Chicago, Illinois

G A R Y
WROUGHT STEEL WHEELS



June 18, 1927

ELECTRIC RAILWAY JOURNAL

1094a

5 out of 7

Regularly use "TOOL STEEL" Gears and Pinions

In the Electric Railway Journal, Maintenance Competition, May 21, 1927, seven articles were submitted from men in Philadelphia, Chattanooga, Atlanta, Washington, New Orleans, Birmingham, and Portland, Maine. Presumably these companies are alert in an effort to keep down maintenance costs.

5 out of 7 of these companies regularly use "Tool Steel" gears and pinions,

and

3 of the 7 companies, when buying new equipment, have specified "Tool Steel" gears and pinions on their new motors.

also

In the April contest (April 16th issue of Electric Railway Journal) 5 out of 6 were submitted by "Tool Steel" gear and pinion regular users.

"Tool Steel" gears and pinions reduce maintenance costs; if you take almost any classification of the "Live Wires" in the industry you will find that the great majority keep down their maintenance costs with "Tool Steel" gearing.

The Tool Steel Gear & Pinion Co.
CINCINNATI, OHIO

Here's the
monthly
record of
Total rolling
Stock
Articles and
users of
"Tool Steel"
gears

April	5 out of	6
May	5 out of	7
June	7 out of	8
July	4 out of	5
Aug.	6 out of	8

Total 27 out of 34

79%

Out of 34 Contestant
articles, 27 came from
Companies regularly using
"Tool Steel" Gears and
Pinions

THE FIRST CAPITAL PRIZE WINNER IS A "TOOL STEEL" GEAR USER



The Standard of Quality

TOOL-STEEL QUALITY GEARS AND PINIONS



These are the things that Win and hold patronage

WIDE doors and low steps leading to an interior as spacious and free from obstructions as that of the most modern rail vehicle.

Room for a six-foot man to stand without taking his hat off.

Seats that are wide and comfortable.

No awkward "bulges" in the floor. No seats arranged in unnatural positions.

Windows spaced so that every passenger gets an unobstructed view.

Sash that opens wide and easily.

Hand-holds that call for no stretching or straining, and push-buttons that come to hand naturally.

No engine fumes, no vibration, and no noise.

These are the things in a Versare Highway Unit that win and hold patronage.



Versare

Making it easy for people to and for you to make a profit

CERTAINLY you are interested in inducing more people in your community to use your rail and highway services regularly. You want to encourage the short-haul riders. You want to appeal to the "automobile commuters."

In the Six Wheel Highway Unit Versare offers you very tangible "talking points."

Comfort features, such as those listed on the front page of this advertisement.

Convenience features, such as the "circulating load," with separate entrance and exit doors, wide aisles and few stanchions.

Safety features, such as the triple air, mechanical and electric braking systems, no tendency to skid, ample speed and pick up to maneuver in modern traffic, and almost effortless driving.

What is more, Versare offers you these things in a vehicle designed specifically to meet the conditions of operation under railway management on regular schedules, and in city or inter-urban service.

In half an hour's conference and a short demonstration we can show you the reasons why maintenance, depreciation and operating costs on the Versare Six Wheel Highway Unit are so low as to set an entirely new standard.



-
- A dark, grainy photograph of a car's interior, showing the dashboard and steering wheel area. The image is very dark and blurry, with some indistinct shapes visible.

Each Versare installation meets conditions exactly in a given locality.



VERSARE Highway Units for use on your property will not necessarily be identical with those now operating in New York, Albany, Boston or Montreal.

Perhaps you need more luxurious upholstery, a different type of door-operating mechanism, a slightly different power plant for higher speeds or particularly hilly country.

In one case we are building Versare Highway Units for all-electric drive,—an advanced type of “trackless trolley.”

It is our aim to deliver vehicles that will fulfill all our claims and perform efficiently under any given conditions. Our engineers are ready to consult with any interested railway executive with this end in view.

Versare Corporation
Albany, N. Y.



REVENUE Reaches to Rail Bonds



Type
ATF-2
Arc Weld Bond

ALL Erico Rail Bonds, regardless of type, are distinguished by ease of application, by leech-like adherence to the rail, by reducing power cost and raising voltage to normal.

The advantages are revealed in lower maintenance costs for you; faster schedules and better lights for patrons.

It seems a far cry from rail bonds to riders, yet revenue reaches clear down to rail bonds.

If you are one of the companies that don't use Erico Bonds—most electric railways do—now is the time to start eliminating one source of worry.

Investigate. Get the details. Address—

Type ATF-2 Arc Weld Bond

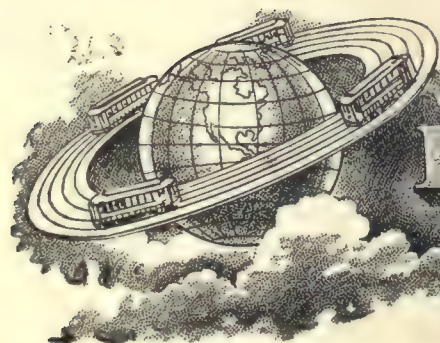
Extra heavy steel terminals permit use of large welding rod—big copper "U" loop gives great flexibility—stranded copper cable eliminates destructive vibration—great strength in the weld assures permanent terminal contact. Quick installation at low cost. Try them.

The Electric Railway Improvement Co.

2070 E. 61st Place,
Cleveland, Ohio



JUST as the electric railway companies have to compile and be guided by exhaustive statistics as to peak loads, traffic densities, costs per mile, and so forth, we must constantly keep ourselves informed as to purchasing power, density of population and all vital market information in order to maintain our service as an active asset of your service.



Barron G. Collier

INCORPORATED

CANDLER BLDG. NEW YORK



View of the Miami Causeway day following the Florida Hurricane. Observe all Elreco Poles are standing.

OF several thousand Elreco Poles installed in Miami at the time of the famous hurricane not one was lost. Striking evidence of Elreco strength and stability!

Their well-known strength was only one factor that led to Elreco installation. Beauty, of course, was a consideration, but strength plus economy was the fundamental reason why they were installed.

Light in weight, accessible, adaptable—span and trolley wires, lighting wires, lighting units, even traffic signals may be hung on Elreco Poles.

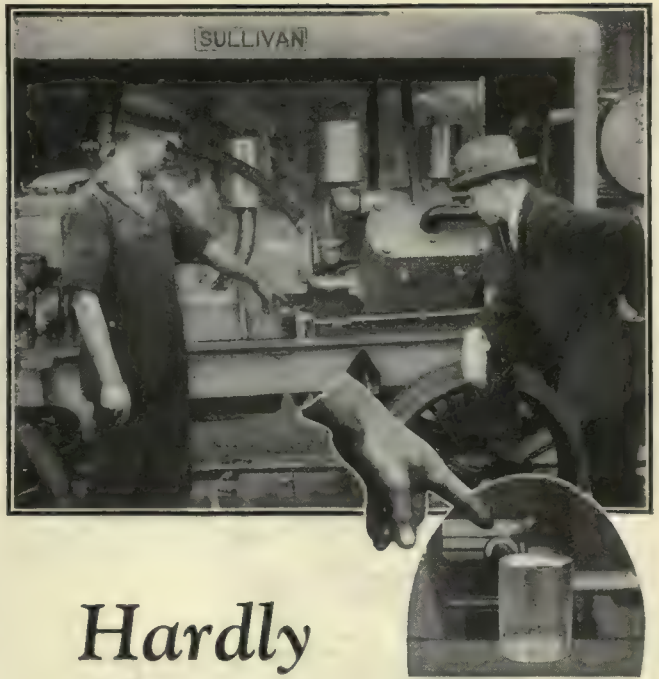
Couple these advantages with the installation and upkeep of three or four companies using one pole and it is readily seen why Elreco Tubular Steel Poles are a four-in-one cost reducing installation.

We can save you money. Write—

**THE ELECTRIC RAILWAY
EQUIPMENT COMPANY**

2900 Cormany Ave.
Cincinnati, Ohio

30 Church St.
New York



**Hardly
a Ripple!**

Full Speed, 800 R.
P. M. but not
a Drop
Spills

**Now Sullivan gives you
“Vibrationless” Compressors**

Vibrationless operation of your portable compressor means trouble-free service. It means dependable air power, freedom from delays, and protection for your profits—to say nothing of long life for your compressor.

And now in the portable compressor, as in the high grade automobile, vibration has been reduced to almost zero.

The picture shows a stock Sullivan 310-ft. capacity portable, running at full speed. A glass of water filled to the brim is standing on the frame. The wheels are not blocked, and the compressor is not braced in any way. Yet the surface of the water barely ripples, and not a drop is spilled.

There are reasons why Sullivan Compressors are vibrationless.
Send the coupon for information.



Sullivan Machinery Company
150 S. Michigan Ave., Chicago, Ill.

SULLIVAN

Send me free Catalog describing Sullivan Vibrationless Compressors.

Name

Street

City State

Occupation

Sullivan Machinery Company
150 S. Michigan Ave., Chicago, Ill.

Send this Coupon

There are reasons why Sullivan Portable Compressors are vibrationless. Send for Catalog 3283-F.

How PROCESSED

*takes the guess
out of
welding wire*



Every type of welding work has certain individual requirements. All Page Welding Wire and Electrodes are processed by special Page methods to meet the exact requirements of the type of work for which they are recommended.

Each piece is plainly stamped with an identification mark and an actual shop test made to prove its performance "on the job."



The result is welder's time saved, better work and lower costs. Prove this for yourself with a sample. Your name and address bring it.



PAGE STEEL AND WIRE COMPANY

Bridgeport, Connecticut

District Offices: Chicago New York Pittsburgh San Francisco
An Associate Company of the American Chain Company, Incorporated,
Bridgeport, Conn.

PAGE-ARMCO PROCESSED

Welding Wire and Electrodes



Check

Car movements at time points with Nachod Automatic Headway Recorders. The cars mark their own time on the chart—an easily readable record, easily filed for reference.

The chart shows whether the car is early or late, points out irregularities in the schedule. The careful manager has a complete and accurate record.

Automatic Block Signals and Highway Crossing Signals

to meet every operating requirement. We shall gladly submit recommendations for complete systems.

Nachod Spells Safety

Send for catalogs.

Nachod & United States Signal Co., Inc.
4777 Louisville Ave., Louisville, Kentucky

Griffin Wheel Company

410 North Michigan Ave.
Chicago, Ill.

Griffin Wheels

with
Chilled Rims
and

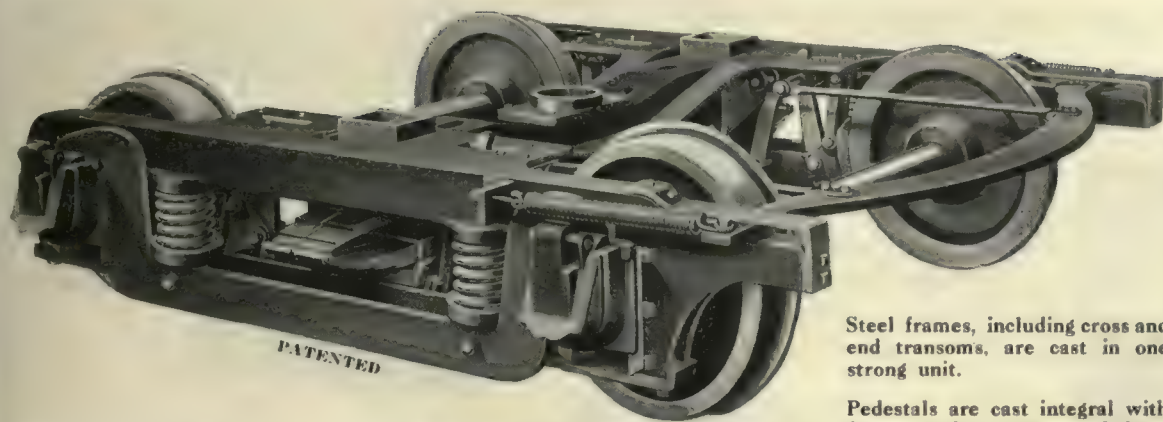
Chilled Back of Flanges
For Street and Interurban
Railways

FOUNDRIES:

Chicago
Detroit
Denver
Cleveland

Boston
Kansas City
Council Bluffs
Salt Lake City

St. Paul
Los Angeles
Tacoma
Cincinnati



Steel frames, including cross and end transoms, are cast in one strong unit.

Pedestals are cast integral with frame, and are protected from wear by renewable hardened spring steel liners.

Commonwealth Motor Trucks

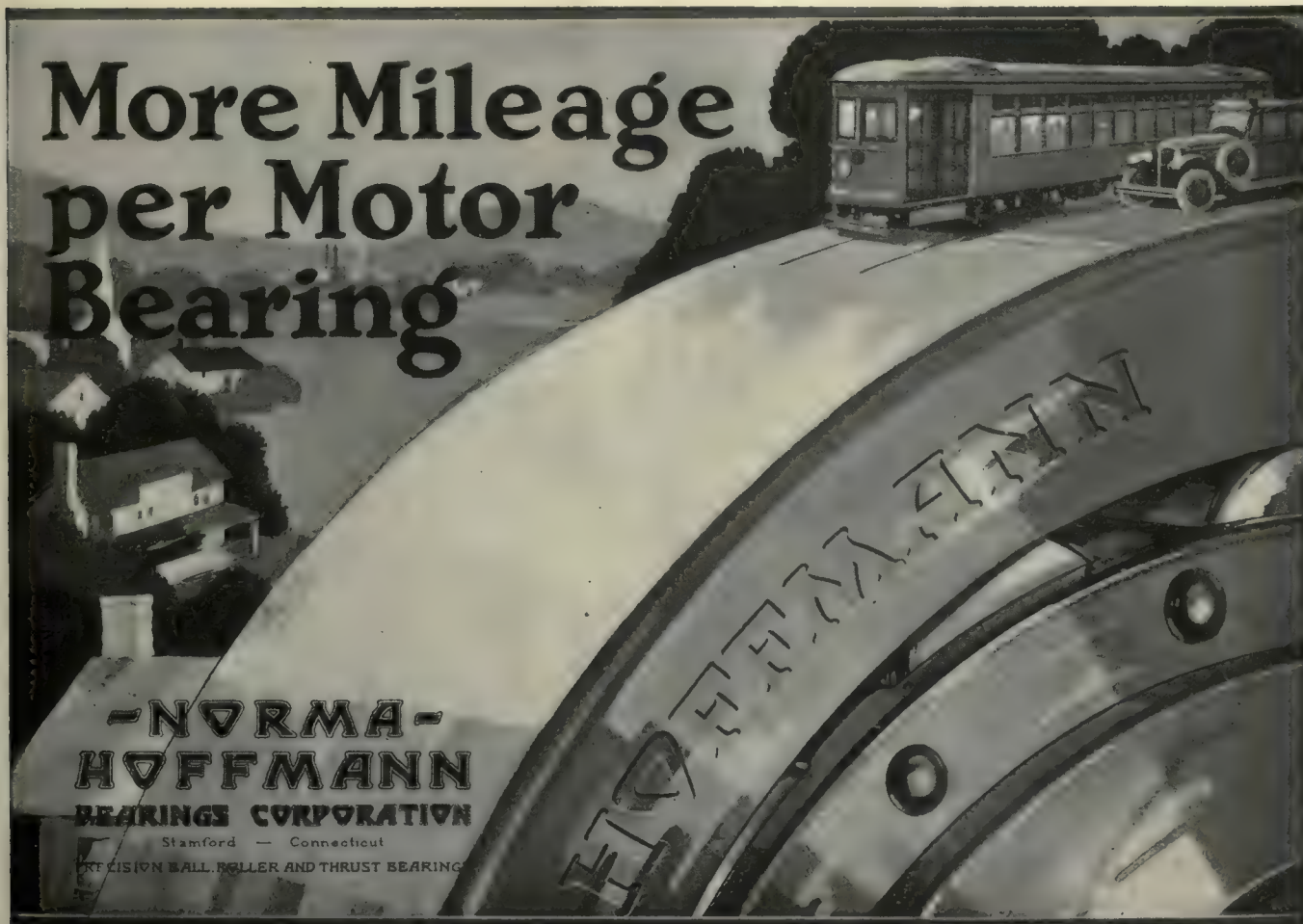
for Street Railway Service

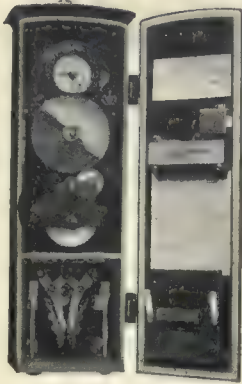
like Commonwealth Trucks for high speed interurban service, are designed by engineers familiar with the structural requirements for maximum service at minimum cost for maintenance. And they have been long accepted as standard by many leading railways.

COMMONWEALTH STEEL COMPANY
Granite City, Illinois

More Mileage per Motor Bearing

**-NORMA-
HOFFMANN**
BEARINGS CORPORATION
Stamford — Connecticut
PRECISION BALL, ROLLER AND THRUST BEARING





You know the Story on Time Switches

That there isn't any question as to the reliability of the most widely used Time Switch.

That "tryouts" aren't necessary with a Switch that you know has been in successful use for over twenty years.

And that this Time Switch is built by Anderson from beginning to end at their factory in Boston.

Bulletin
No. 37
describes
and
illustrates
these
Time
Switches

Albert & J. M. Anderson Mfg. Co.
289-305 A St., Boston, Mass.

NEW YORK CHICAGO PHILADELPHIA LONDON

Greater Service Per Dollar Invested



"Tiger" Bronze Axle and Armature Bearings

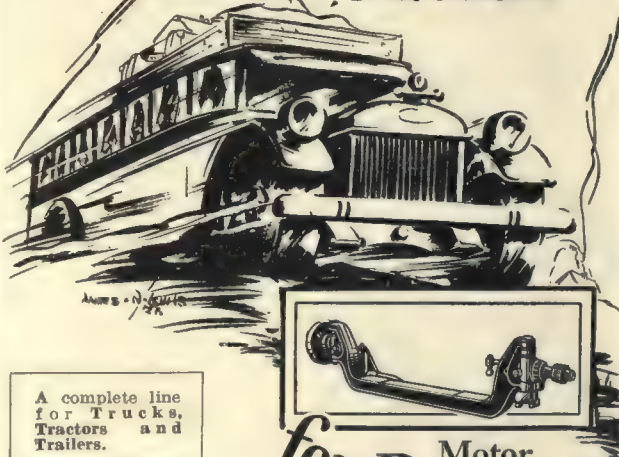
More-Jones "Tiger" Bronze castings for axle and armature bearing service was one of our early achievements. This is probably the most widely known bronze on the market. It has stood the test of time. There is nothing better for long, efficient and most economical results. Let us quote you.

**National Bearing Metals
Corporation**
New York, N. Y. Pittsburgh, Pa.
Jersey City, N. J. Meadville, Pa.
St. Louis, Mo.
Portsmouth, Va.

MORE-JONES QUALITY PRODUCTS

SHULER

FRONT AXLES



A complete line
for Trucks,
Tractors and
Trailers.

for **BUSSES**

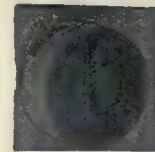
SHULER AXLE COMPANY

Louisville

Incorporated

Kentucky

Member of Motor Truck Industries Inc. of America



Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

No-wear Check Pawl
Free-Winding Tension Spring
Ratchet Wind
Emergency Release
Perfect Automatic Lubrication

Earll Catchers and Retrievers

C. I. EARLL, York, Pa.

Canadian Agents:
Railway & Power Engineering Corp., Ltd., Toronto, Ont.
In All Other Foreign Countries:
International General Electric Co., Schenectady, N. Y.

ROLLED STEEL WHEELS STEEL AXLES STEEL SPRINGS ARMATURE SHAFTS



STANDARD STEEL

WORKS COMPANY
PHILADELPHIA, PA.

BRANCH OFFICES:
Portland
Richmond

WORKS: BURNHAM, PA.

Chicago
St. Louis

New York
Houston

San Francisco
St. Paul

Pittsburgh
Mexico City



Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petti-coat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000
Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.

Est. 1848—Inc. 1870



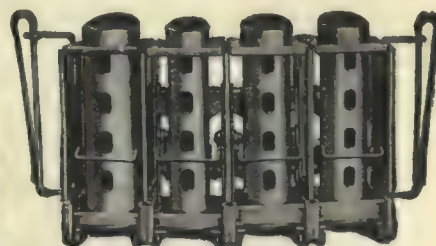
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Drills, Track
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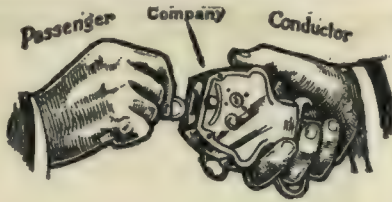
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Stokers, Mechanical
Babcock & Wilcox Co.
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Stones (Commutator)
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Stop Signals
Nichols-Lintern Co.

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Electric Service Supplies Co
General Electric Co.
Ohio Brass Co.
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Strand
American Steel & Wire Co.
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Street Cars (See Cars, Passenger, Freight, Express, etc.)

Superheaters
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Wm. Wharton, Jr. & Co., Inc.

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American Steel & Wire Co.
J. A. Roebblings Sons Co.

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National Bearing Metals Corp.
R. D. Nuttall Co.
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Trolley Bases, Retrieving
R. D. Nuttall Co.
Ohio Brass Co.

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Commonwealth Steel Corp.
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General Electric Co.
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Welders, Rail Joint
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.

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Welding Wire and Rods
Page Steel & Wire Co.
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Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

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Griffin Wheel Co.

Wheels, Car Steel & Steel Tire
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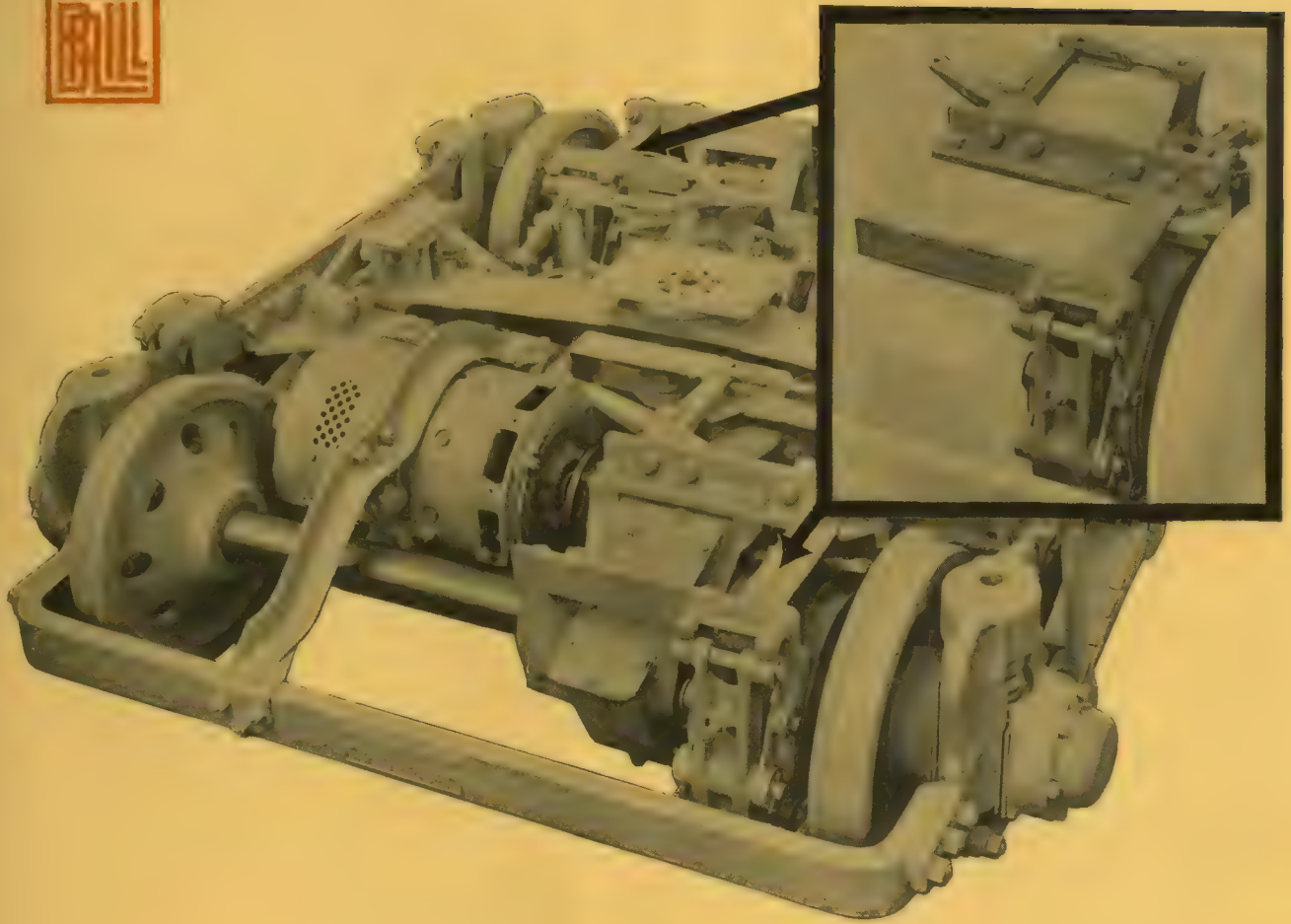
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1928

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April 28, 1928

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South Shore Line Builds Attractive Freight Service693

Freight business of the Chicago, South Shore & South Bend Railroad has shown a remarkable growth as a result of the railroad's intensive selling efforts. New stations, larger loading platforms and double-end sidings speed up service and make over-night delivery of l.c.l. shipments possible.

Public Relations Man Plays an Important Rôle. 696

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In the Philadelphia Rapid Transit Company organization publicity work includes preparation of information for the public handling of complaints and attention to lost and found articles, as well as the usual publicity and advertising. Prompt examination of all suggestions for service improvements has led to greatly improved public relation.

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Humanizing the Service

MUCH depends, in these days of intense activity, on the manner in which goods are displayed. This is true not only of the butcher, the baker and the dry-goods merchant but of the electric railway as well. In the past there has been a great deal of talk about what should be done. The JOURNAL has given space to many articles of real merit on how to better the sales methods of the railways. At one time there was but little to publish regarding actual accomplishment. Today, however, tangible results can be pointed out, and new methods are constantly coming to light.

One example of this new attitude is seen in the Philadelphia public relations department, an article on which appears in this issue. Another instance where the same spirit is making itself felt is in the organization of a personnel department by the Cleveland Railway, which will be the subject of another article to appear soon. Still another phase is the formulation by the North Shore Line of rules for employees in responsible positions. An article explaining this will also appear shortly. All these developments present evidence that the industry really is giving attention to humanizing the service. The ideas back of them are free for all to use. Watch for the articles.

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(Published in London)

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BETTER RAIL, BETTER TRANSPORTATION

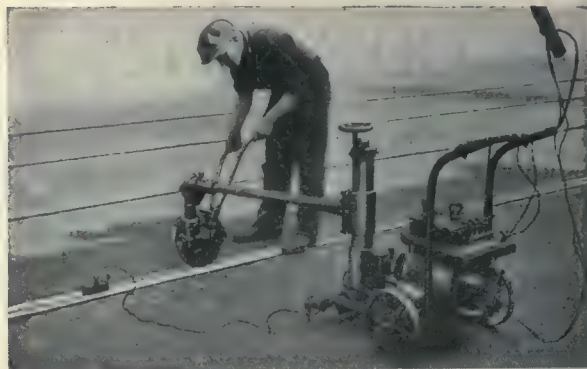
"Noise shortens life"

So said Professor A. M. Low, eminent experimenter with noise prevention in London tubes.

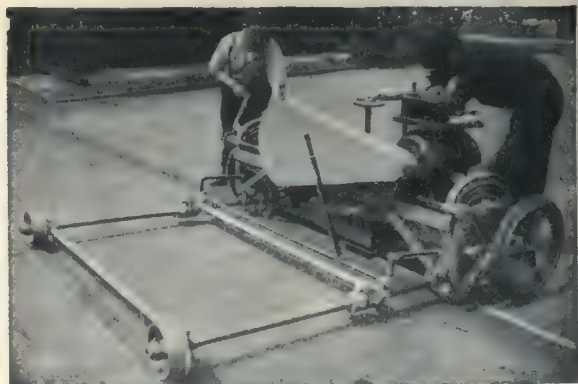
Noise in car operation certainly is a sure sign that life is being shaken and taken out of track and rolling stock.

Smooth rail certainly reduces noise and lengthens life of car and track.

Maintenance money put into track grinding and Ajax Arc Welding certainly goes farthest.



Eureka Radial Rail Grinder



Vulcan Rail Grinder



Reciprocating Track Grinder

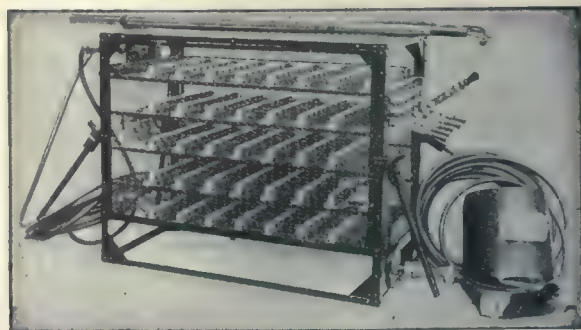
Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

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Chas. N. Wood Co., Boston
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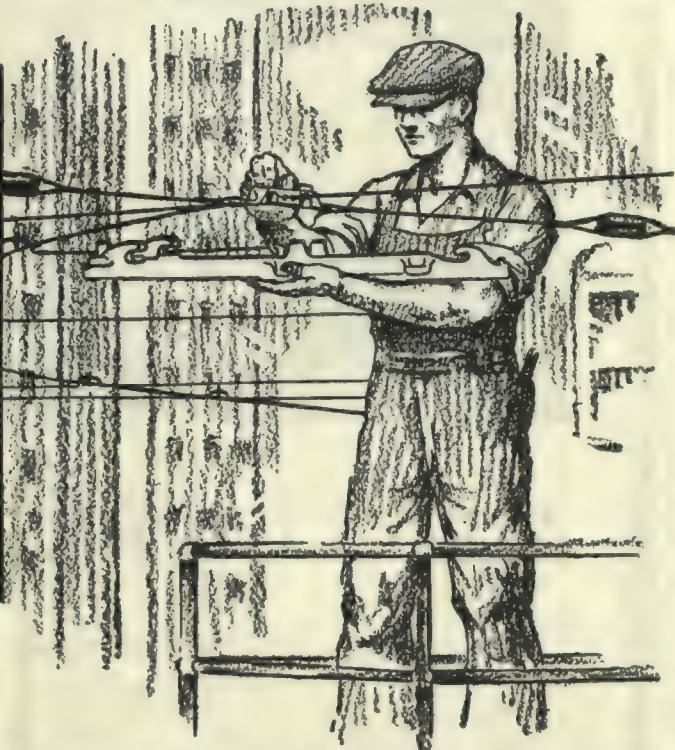


"Ajax" Electric Arc Welder

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The New ^{O-B} Duplex TROLLEY FROG



Used on Any Curve—Stays Up Longer—Easier to Renew!

NOW you can have all three of these service advantages in *one* frog. They are combined in the modern design, O-B Duplex Frog—made with overlapping runners, *renewable underrun*, and adaptable to any degree of turnout. Each of these features in itself means a saving—in time, materials, labor and revenue. Any one feature would justify the use of the Duplex Frog on your property—as another means of saving that 1% in costs that adds nearly 20% to the net!

The renewable underrun, next to longer life, is the outstanding advantage of the Duplex Frog. It is seldom necessary to replace the underrun; it will average from 300,000 to 500,000 car passes. *Then* replacement is

made in half the usual time, without disconnecting cross span or turnout trolley wire, without the use of block and tackle, and with no need of relocating or realigning the frog for satisfactory operation. The removal of two bolts that attach the underrun to the suspension yoke is all that is needed to release the underrun.

Overlapping runners keep the wheel off of the pan and O-B Cam Tips insure a smooth approach and leave—both add to the life of the trolley wire and frog itself.

Your O-B Salesman will give you complete information—and arrange for prompt shipment of your order for the Duplex Frog.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
818L

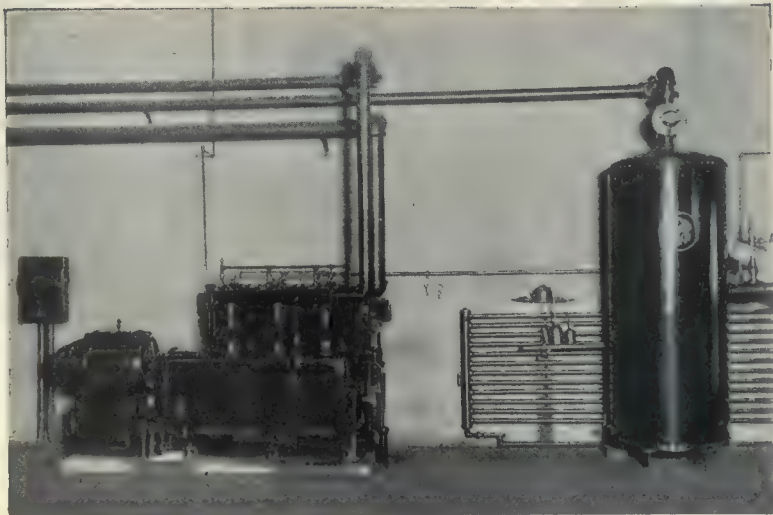
Ohio Brass Co.

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ST. LOUIS SAN FRANCISCO LOS ANGELES

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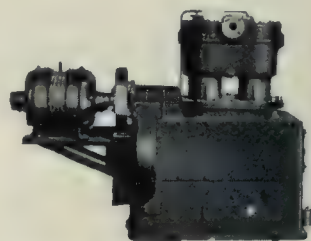
WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works, Wilmerding, Pa.

WESTINGHOUSE-NATIONAL
Air Compressors
 "QUALITY MACHINES FOR QUALITY SERVICE"



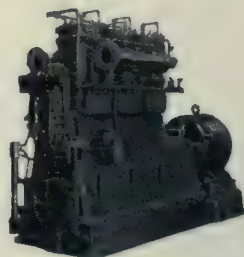
Type "N" compressor, 12 to 60
 cu.ft. displacement.



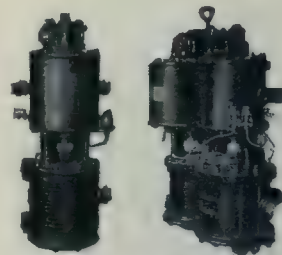
2V Type Compressor—75 to 150
 cu.ft. displacement.



3VS Type Compressor—208 to 468
 cu.ft. displacement.



3VD Type Compressor—550 to 700
 cu.ft. displacement.



Steam Driven Types—35 to 150
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THE use of Steel Twin Ties in modern paved track construction saves both time and money, and has as a result a better, more enduring construction.

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CLEVELAND, OHIO

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THE BASE OF MODERNIZATION

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STEEL PARTS

—are manufactured to meet all operating conditions and to withstand the strains and stresses to which they are subjected during long periods of service.

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ARMATURE SHAFTS
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Here's the buying guide for the modern well-equipped car Essco Catalog No. 7

For the past few months we have pointed out in some detail a few of the many Keystone Specialties found on the modern well-equipped car—such as

- Hunter-Keystone Illuminated Signs
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MANUFACTURER OF RAILWAY, POWER

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It's simple enough to repair the bad joints with Thermit!

Less than 3 ft. of rail to be opened—just enough to get at the joint and set the moulds.

Only a bit of concrete to be removed between the ties under the joint.

Just a little shimming to raise the cupped part of the receiving rail, flush with the discharging rail.

Cut away enough of the discharging rail to allow placing of insert.

Then make your Thermit weld the same as in laying new rail.

And you get the same result—a continuous piece of rail free from future joint troubles as long as the rail itself will last.

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In Less than Two Years

14 *New Routes acquired*

6 *Re-orders placed*

5040 *daily bus miles
added*

The policy that is building business and winning for
the Camel City Coach Company, Winston-Salem, N. C.

Standardizing
on **YELLOW COACHES**

“W



The Camel City Coach Company states its reason for Standardization

“ We are highly pleased with our Yellow Coaches and the service they are giving our riders. They are the best coach on the road today and we do not know of any other coach, at any cost, that is as good. We have built up our business with them. We have no kicks of any kind to register, and if the Yellow Coach Company keeps its service up to its present high standard we will continue to standardize on Yellow Coaches and replace our worn out equipment with them. ”

have built up our business with **YELLOW COACHES**"

Two years ago the Camel City Coach Company started motor coach operation with six Type X Parlor Car Yellow Coaches.

Among its assets were a type of motor coach chosen after a careful survey of the field plus a determination to widen its range of service and build up a dominating transportation business.

By leaps and bounds additional routes were acquired; increasing bus miles operated per day from 960 to 6000. And to keep pace with this expansion, re-orders were placed steadily for Yellow Coaches. In all, the company has purchased Yellow Coaches seven times, increasing the original fleet of 6 to 33.

With the exception of one route, it is all inter-city service handling a widely diversified class of rider ranging from high class residential patronage and industrial factory workers to farmers and tourists— a remarkable yardstick for measuring approval toward the standardized make and type of vehicle offered.

Yellow Coaches are performing 75 per cent of all scheduled service, and miscellaneous buses acquired in the purchase of bus routes are being replaced by Yellows as rapidly as possible.

The Camel City Coach Company has learned from experience that standardization pays. Repeat orders, necessary to service the thousands of daily bus miles added, indicate not only that satisfaction arising from dependable and economical operation but the wisdom of servicing routes with motor coaches to which the public responds.

Yellow Coaches are route builders.

They are also fleet builders.



A million and a half bus miles per year at an average cost of 16.05 cents per mile

On routes served exclusively by Yellow Coaches, and on the basis of a three months' careful check, it is shown that Yellow Coaches are operating at a cost of 16.05 cents per bus mile. *And this low figure includes a 6 per cent State Tax and a 4 cents per mile depreciation charge.*

Operating costs include all operating and maintenance expense—fuel, drivers and garage wages, shop costs, maintenance, lubrication, insurance, general and miscellaneous, interest, tires, station expense and a depreciation item of 4 cents per bus mile.

And in all the hundreds of thousands of miles operated there have been but two road failures due to minor ignition trouble.

Does it pay to standardize on Yellow Coaches?

Ask the Camel City Coach Company!

YELLOW TRUCK & COACH MANUFACTURING CO
 SUBSIDIARY GENERAL MOTORS CORPORATION
 5801 WEST DICKENS AVENUE, CHICAGO, ILL.



There is no need
for waiters when
customers are glad
to serve themselves.



SELF SERVICE CARS

On thousands of cars in nearly a hundred cities, the NP Automatic Treadle Doors have shown passengers how easy and safe it is to exit by their own efforts.

TREADLE-IZE!

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DECELECO

—a name which stands for the most modern and efficient type of Bus and Switch Cell structures.

ENGINEERS of modern electric railway substations—the Cincinnati Street Railway for example—have come to recognize in DECELECO a standard cell structure which combines convenience in construction with effectiveness at low cost.

With DECELECO, standardized construction can be applied to any cell structure. Fire-resisting, non-conductive resilient barriers between circuits and equipment are easily erected on the job. Any damaged cell part can be removed and replaced at any time without dismantling the rest of the structure.

“ZELLITE”, the material of which DECELECO slabs are made, can be cut, drilled and worked as easily as wood. It has more than 15 years’ unqualified endorsement of foreign engineers in all parts of the world. In certain foreign countries it has been standardized to the exclusion of all other materials for cell structures.

The extent to which DECELECO Constructions have been accepted in this country in a remarkably short time by representative electric railway and public utility operators is expressed by the outstanding companies listed herewith.

Whenever you desire, our engineers will be glad to give you full information about DECELECO, our products and completed installations, also *why it is that “ZELLITE” is more and more being recognized as the most suitable cell structure material.*

A few representative installations

American Gas & Electric Co.
Carnegie Steel Co.
Cincinnati Street Railway
City of Detroit
City of Lansing
Consumers Power Co.
General Electric Co.
Goodyear Tire & Rubber Co.
International Paper Co.
Los Angeles Gas & Electric Co.
Monongahela & West Penn Public Service Co.
Paul A. Sorg Paper Co.
Penn. Public Service Co.
Pollak Steel Co.
Wheeling Electric Co.
Youngstown Sheet & Tube Co.

DECELECO, Inc., Wayne, Michigan
New York—50 Church St. Chicago—447 Monadnock Block



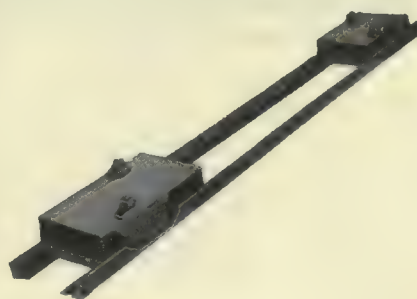
YOU know how it is with ordinary track—stays good a few years (sometimes very few)—then it gets full of wrinkles and bumps.

The joints sink, and have to be bolstered up.

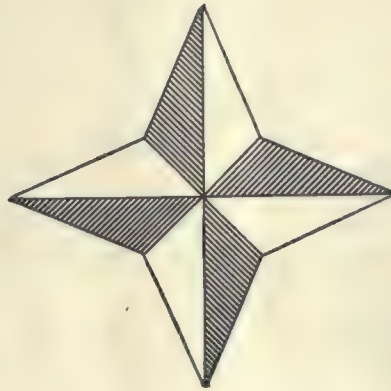
That sort of track gets old before its time—has to have its face lifted.

Dayton Tie Track stays young—you don't have to call in the plastic surgeon.

**DAYTON
Tie Track
Doesn't
Need "Face
Lifting"**

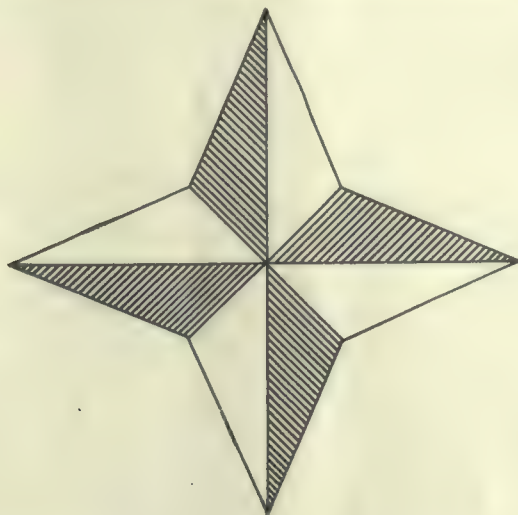


The Dayton Mechanical Tie Co.
DAYTON OHIO



How much of your earnings are left behind in slow starts?

How much is taken by accidents that are preventable?



There was a time when the street car was the fastest vehicle between curbs. Today many of them are the last to start—and to stop. Both short comings are needless handicaps. Slow starts beget slow schedules. Tardy halts imply accidents and resultant damage suits.

The Cincinnati Car Company will be glad to show you how Cincinnati **BALANCED LIGHTWEIGHT** cars have speeded up schedules. We will welcome the opportunity to show you in **ACTUAL REPORTS OF ACCIDENTS PREVENTED** how greatly Cincinnati Duplex-Air-Magnetic Braking Equipment **REDUCES THE STOPPING TIME**.

Faster schedules and reduced stopping time are factors that create increased earnings and reduce accident losses on every line which operates Cincinnati **BALANCED LIGHTWEIGHT** Cars. Their records are available for you to study.

CINCINNATI CAR COMPANY
CINCINNATI, OHIO

CINCINNATI **BALANCED LIGHTWEIGHT** **CARS**

—still a step ahead of the modern trend!



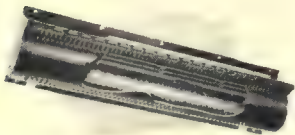
"Consolidated" Aviation Motor Heaters installed in this airplane proved a success in the tests made on the occasion of Colonel Lindbergh's visit. The tests were made at Westerlo Island.



Visible Mercury Thermostat with Glass Cover.



Heating Element of heavy nickel chromium wire, highly insulated—Rust proof, non-magnetic, withstanding and resistant to mechanical strain.



Protected Open Coil Heater. The guard positively prevents contact with any live parts. Furnished in Cross-seat, Panel and Truss Plant Types. Approved by the Underwriters' Laboratories.

CONSOLIDATED

*leading the present—
pioneering the future*

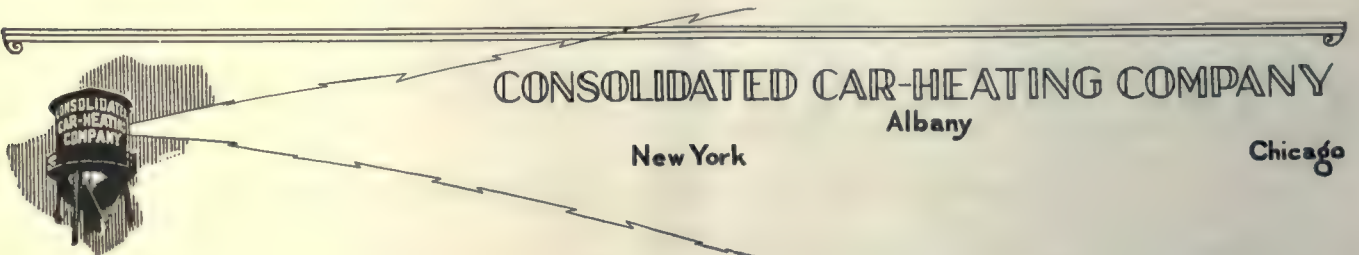
Flying for all is coming! The future will bring with it a solution of the problems of safety and comfort for air passengers. The picture story above proves it.

Meanwhile, the world travels on wheels and the problem of heating comfort for passengers has been solved by the installation of CONSOLIDATED ELECTRIC CAR HEATERS equipped with CONSOLIDATED *visible* Thermostatic Heat Control and Safety Switches.

CONSOLIDATED ELECTRIC HEATERS are made in open and closed element types, in a wide variety of styles to meet any car design requirements. They can be furnished for 600, 1200, or 1500 volts. They give maximum economy, safety and service.

Consolidated Thermostatic Control is automatic and efficient, without failure or forgetting, without supervision or inspection.

The car heating problem of today may be troubling you—why not let CONSOLIDATED help you give your passengers riding comfort?



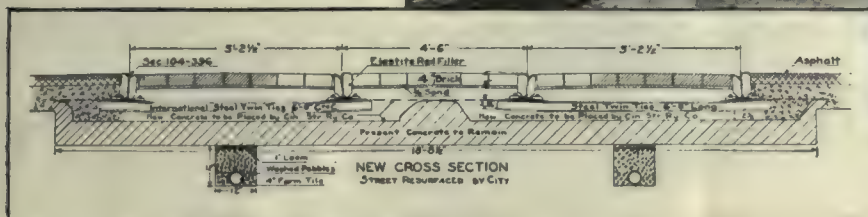
CONSOLIDATED CAR-HEATING COMPANY

Albany

New York

Chicago

Carey Elastite System of Track Insulation is a preformed asphaltic compound reinforced with asphalt-saturated fibres. It is impervious to moisture, can be installed at any temperature, and forms a resilient cushion between the rail and the pavement. Slabs are preformed to fit any rail section.



Showing the method of track reconstruction on Reading Road, Cincinnati.

Cincinnati-

a glowing example of traction development

BY June 1, of this year, The Cincinnati Street Railway Company will have completed one of the most extensive improvement programs ever undertaken by a street railway system.

New car-shops—178,000 square feet of floor space! A new power distribution system . . . nineteen substations, ten of them brand-new and all full-automatic—under supervisory control.

Twelve miles of track reconstructed in 1926. Twenty-one miles in 1927.

Twenty-four miles (estimated) in 1928. And The Cincinnati Street Railway Company has made some radical improvements over old methods of track construction . . .

For every foot of this track is protected by a lastingly resilient cushion between the rails and paving. An average, every year, since the beginning of 1926, of *more than three hundred and fifty thousand lineal feet* of rail filler—Carey Elastite System of Track Insulation!

Carey Elastite
TRADE MARK PATENTED
"GUTHRIE DEPOSITS" "GUTHRIE DEPOSITS"

THE PHILIP CAREY COMPANY
Lockland, Cincinnati, Ohio

SYSTEM OF TRACK INSULATION

ELECTRICITY IMPROVES SERVICE AND INCREASES REVENUE



THE ILLINOIS CENTRAL *electrified to improve suburban operation*

The Illinois Central, which serves Chicago's crowded suburban area, carried more than thirty million commuters in 1927—twenty-five per cent more than in 1926.

President L. A. Downs, of the Illinois Central, attributes much of the increased patronage to the faster and more frequent train service provided in the electrified zone.

Complete electrification of terminal lines not only brought about this sudden and substantial increase of riders but also turned the \$337,000 operating deficit of 1926 into an income of \$530,000 in the following year.

Speed always appeals to commuters; and in addition to speed, riders have been attracted by the absence of smoke, cinders, and noise; by the seating capacity and smooth motion of the trains; and by the clean comfort of the cars.

Not only at terminals, but on the long, level stretches of main line, electric operation produces more revenue, simplifies operation, reduces maintenance, and gives better service.



Manifold advantages of electric operation have resulted from the use of electric locomotives and cars on main and branch lines, at terminals, and in suburban traffic; gas-electric cars for light-traffic lines; oil-electric locomotives in freight yards; and gas-electric buses for feeder service. Electric floodlights expedite freight sorting, and electric signal systems promote safe transportation.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.. SALES OFFICES IN PRINCIPAL CITIES

Electric Railway Journal

McGraw-Hill Publishing Co., Inc.
JAMES H. MCGRAW, President

Consolidation of
Street Railway Journal and
Electric Railway Review

CHARLES GORDON
Editor

Volume 71

New York, Saturday, April 28, 1928

Number 17

"Window Dressing" Is an Important Activity

FEW retail stores make any pretense of attracting customers without preparing attractive displays in the show windows so that the passers-by may get some idea of the goods on sale within. Where the store makes any attempt to go after a substantial class of trade the window dresser and his art become an important factor in the personnel. Much literature has been written on the subject, and courses of study have been prepared to teach the window dresser the fine points of his business.

So it should be with the transportation company. In the article on the public relations department of the Philadelphia Rapid Transit Company by J. J. Davies in this issue the public relations man is likened to the store window dresser. He is the man who calls to the attention of the riding public the advantages of using the transportation system. He is the man who makes contact with the various citizens' organizations. He is the man who prepares the advertising designed to reach the prospect. Even more, he is the man who must mollify the patron who feels that he has a grievance.

At first glance, it might be assumed from the article that a large and expensive organization is needed to conduct a public relations department properly, so that only the very largest companies can afford to maintain one. The author is emphatic in declaring that one live wire, with the right personality and a proper understanding of his work, can accomplish wonders for a small property. In these days of intensive competition with personal transportation there is no company that cannot afford to make such an expenditure, for it is likely to prove the salvation of the property.

No Grass Growing Under Their Feet

COURAGE of high order is reflected in the report of the Market Street Railway, San Francisco, for 1927. That company operates not only at a 5-cent fare, but in the face of competition from the San Francisco Municipal Railway. It is paying no dividends, to be sure, but it is making a good record and it is apparently exhausting every resource of men and management in the adoption of the most up-to-date operating ideas. To run the gamut of all the things it has done would, of course, be impossible.

Last year its expenses increased \$226,764 over 1926 on account of increases in wages of employees, better maintenance of equipment and "increased costs of efforts to obtain new business." Truly that last phrase is significant. In the absence of any segregation of the items of expense there is no way to tell how much was spent in this effort to secure new business, but it is an activity of which no thought was taken by the railways only a short time ago. It may, of course, be assumed that this expenditure has more than repaid the company.

On its financial side the report is most satisfactory, everything considered. The net income was \$258,158, but this was after the payment of all expenses, including interest on funded debt. The sum of \$500,000 was set aside for depreciation, and another \$500,000 was put aside for the bond redemption. A provision of the bond indenture infrequently encountered these days is that the bonds acquired for the sinking fund shall remain alive and continue to draw interest for the retirement of additional bonds. This, of course, imposes a mounting burden, but it was considered advisable under the present circumstances, particularly the circumstances incident to the questions about the company's maturing franchises. Certainly the company is operating against great odds, but they appear only to have increased the fortitude of the management. In short, the annual report proves that the responsible operating officials of the company are not permitting the grass to grow under their feet.

Lackawanna Electrification Significant

DECISION of the Lackawanna Railroad to begin at once the electrification of its main commuting lines leading to New York City is doubly significant. In the first place the project involves 78 route miles, making it one of the longest suburban electrifications in the United States. Moreover, this large undertaking has been made possible at the present time by the willingness of the public to pay an increased fare for improved service.

The plan includes the entire Morris & Essex division from Hoboken to Dover, as well as the Passaic & Delaware and the Montclair branches, with a total of 173 miles of track. It is planned to operate all suburban service on these lines with multiple-unit cars. Through passenger service and all freight service will continue to use steam motive power. The Boonton branch, which carries the greater part of the Lackawanna's freight, will not be electrified.

Marked improvement in the suburban passenger service will be made possible by electrification. At present the mile-long tunnel under Bergen Hill, just outside the Hoboken Terminal, seriously hampers operation. On account of the poor visibility with steam operation no train is allowed to enter the tunnel until the preceding train on the same track has cleared the far end. This gives a minimum headway per track of about five minutes, or a combined headway of slightly under two minutes on the three tracks which are used in the rush direction. Present schedules provide sixteen trains in the maximum half-hour. This is believed to be the largest number which can be operated with steam motive power. With electricity, however, the tunnel can be divided into shorter blocks and the headway materially improved.

Other important advantages of electrification are the elimination of the smoke nuisance in the tunnel and in the many residential communities along the line, saving of labor on long trains which now use two locomotives,

and the ability to operate single-car or two-car trains with a small crew in non-rush hours instead of the present trains consisting of a locomotive and three or more cars with a larger crew.

Electrification of the Lackawanna has been in prospect for some years. Few local passenger locomotives have been bought in the past 25 years. The latest lot of cars was built with lower roofs to provide space for pantographs. But the tremendous cost of the undertaking, which is now estimated at \$14,000,000, caused the company to hesitate. Recently, however, a committee composed of representatives of civic bodies in many communities along the line agreed to co-operate with the railroad in securing an increase in commutation fares. In doing so it took the unusual attitude that, in its importance to the communities, the project was so outstanding those whom they represented would be willing to pay increased commutation fares in order to secure the advantages of such improvements in transportation facilities. Under these circumstances the railroad decided to go ahead with the project.

It is expected that the increase in fare will average about 2 cents per trip. The company states that this will not become effective until the electrification is completed, which will take about two years. For their willingness thus to co-operate in the interest of improved service both the railroad and the communities are to be congratulated.

Shifts in Employment Affect Railway Revenues

LABOR-**SAVING** equipment is being eagerly sought in all branches of industry. Development in this direction, especially during this decade, is a logical outcome of the present age of machinery and electrical distribution of power. While this trend is in the interest of national economy and therefore desirable, it must not be forgotten that it is having a noticeable effect on the employment situation.

The extent of this effect is shown in a report of the U. S. Bureau of Labor Statistics, submitted through the Secretary of Labor on March 24 to the U. S. Senate. This report, with accompanying documents, is printed in full in the *Monthly Labor Review* for April, 1928, just issued. Commissioner Stewart gives 1,874,050 as the number of unemployed in January, 1928, as compared with a total of 25,222,742 wage and salary earners in 1925, when there was no noticeable unemployment. The 1928 figures, he explains, do not include persons operating their own businesses or professions. He also points out that this group of unemployed may be subdivided into those temporarily not working because of plant suspensions, and those displaced by changes in industrial and commercial methods. The former are reasonably assured that when their business resumes, they will be restored to employment. In the second group, the job is gone, never to return. The man must change his occupation and seek new contacts. The commissioner thinks it reasonable to estimate that one-half of the present unemployment group belongs to the latter class.

An interesting phase of the employment situation was pointed out by Julius Klein, director of the Bureau of Foreign and Domestic Commerce, Department of Commerce, in an article published in the April 7 issue of this paper. Dr. Klein called attention to employ-

ment increases in the so-called "service" in non-productive industries. That tendency, in a measure, offsets the displacement of labor by machinery in production. Despite this alleviation of what would otherwise prove a very serious unemployment situation, changes in occupation result in major shifts of population from some employment centers, particularly in smaller communities.

This shifting of employment is being felt seriously by some electric railways. Persons who have made a study of the subject point to these basic industrial upheavals as the explanation for traffic losses that usually have been attributed entirely to automotive competition. The facts in any given territory may be ascertained readily. There is no question but that they are worthy of close study and analysis by transportation men.

Voluntary Regulation Will Be Least Restrictive

WHILE the preliminaries among those who favor regulation of interstate buses were marked by a spirit of give and take which promised a united front on the Parker bill before the Congressional committee, a seriously disturbing situation arose unexpectedly. This was due to the disposition of the N.A.C.C. to insist on conditions of administration more or less precise that tended to becloud the main issue.

It is right that each party at interest should stick by its guns, but after agreement on the essentials it does seem that over-emphasis was placed on the need for trying in advance to perfect the machinery of regulation. This does not mean that ends should be left dangling, but the history of regulatory movements makes it plain that it is quite impossible to anticipate all the *minutiae* of the application of a regulatory statute. In the light of that fact, some of the hypothetical cases advanced as criteria of what might be expected to be encountered in the application of the law seemed strained—to put it mildly. Of course, manufacturers are a party at interest, but it would seem to be extremely poor taste, where the operators appear to be ready for regulation, for the manufacturer to attempt to dictate provisions under which the user of his product is to be regulated. This is the view voiced by one manufacturer at the hearing.

Since the general trend of the discussion of the measure at Washington was set forth in the account of the hearing in *ELECTRIC RAILWAY JOURNAL* for April 21, the Interstate Commerce Commission has made its full report to Congress on the matter. This fortifies the opinion of Mr. Flynn, the commission's special examiner, in regard to the principles which should govern interstate regulation of buses, principles the Parker bill followed closely.

If the attempt to stabilize interstate bus operation through regulation should fail at this session of Congress there seems ample reason to attribute the cause largely to this unexpected last-minute disposition to try to make a regulatory law perfect in all of its details at its inception. Certainly the desirability of regulation has been proved. It is unthinkable that present conditions can be permitted to exist much longer. If regulation comes to correct abuses instead of merely to stabilize an industry—the consequences to both the manufacturer and operator may be much more dire than those conjured up by the opponents of the impending regulatory (not restrictive) measure.

Adult Education of Growing Importance

WHILE his remarks were directed primarily at educational methods in the college of today Doctor Hibben, president of Princeton University, in a recent address gave expression to the ideals and purposes which also motivate adult education in industry. Since the turn of the century, when only desultory and spasmodic efforts were made toward an improved personnel, to the present-day opportunities for advancement that are offered to their employees by many utility companies, much has been accomplished for the mental improvement of the man in the ranks.

Unfortunately, that millennium is far distant when instructors can put the idea into the man in industry that study is not so much an instrument for personal improvement as it is an inquiry into the nature of things themselves. However, for the present and the immediate future, if the educational opportunities offered to the employee encourage initiative and arouse in him the desire to make education a continuing process, whether he remains in the utility field or goes into the building of houses or the selling of bonds, then they have been worth while. If he has learned the value of capitalizing on his leisure hours, then the lectures and courses of study under the sponsorship of his company will not have been in vain.

Just as one college president puts it—"we do not nowadays attempt to give an education—we afford opportunities to our students to obtain an education by their own efforts," so education endorsed by utility companies does not mean the absorption of ready-made knowledge but the stimulation of interest in knowledge so that independent study will be undertaken. In the railway business that man who refuses to grow will in the not very distant future find himself off the roster of a progressive company, for only the fittest will survive.

Taxes by Some Other Name

PERSONS who advocate municipal ownership and operation of public utilities are not altogether unlike enthusiasts for "perpetual motion" machines. They seem to think there is some magic in municipal ownership whereby the people get something for nothing. For example, South River, N. J., recently received praise from United States Senator George W. Norris as a "taxless town." Freedom from taxation was made possible, so it was claimed, by the profits from the municipal electric generating plant, from which all expenses of the municipality have been paid for the past three years.

If the story stopped there, one might well envy the happy inhabitants of South River. But—there is a combined state, county and school tax of \$3.65 per \$100 in this "taxless town." This rate is considerably higher than that prevailing in numerous other communities in the same state which make no pretense of being taxless. With roads, bridges, institutions and schools provided for principally by the state, county and school district taxes, the town's municipal expenses naturally are small, and the profits of the electric plant have been sufficient to cover them.

To make this profit, however, it has been necessary for the town to charge more for commercial power than do the near-by privately owned companies. Domestic lighting, which probably does not represent more than one-fifth of the output of the plant, is at the same rate as that charged by the private companies.

Thus the net result of the municipal ownership and

operation of the electric plant in "taxless" South River seems to be that the customers using four-fifths the output of the plant have to pay more for electricity, and everybody pays more taxes than in neighboring communities.

Political Procrastination at Cleveland

EVER since the passage of the Tayler service-at-cost measure in Cleveland in 1909, major moves affecting the Cleveland Railway under the terms of that grant have been followed with great interest by the electric railway industry. This is only natural, since the grant was considered so sound basically that the principle back of it has been applied in many other places. In consequence, the changes made in the grant in 1926 were widely heralded. They were, of course, sound. The need has again arisen for doing something, something heroic, perhaps. Among matters to be adjusted are questions of fares to the suburbs and of bus operation.

No attempt ever was made to extend the service-at-cost provision to the suburbs because until a few years ago the amount of suburban service was comparatively insignificant. When Cleveland had 3-cent fares years ago, the Cleveland Railway and the City Council signed up the three major suburbs—Lakewood, Cleveland Heights and East Cleveland—for long-time 5-cent franchises. When rising costs put the Cleveland fare above 5 cents, the company and the Council succeeded in having the suburbs agree to pay the rate of fare, in force in Cleveland, but this arrangement still permitted suburbanites to ride for less than cost. That, of course, is absurd. It is equally absurd for the Council to dictate to the company a policy of bus operation that has resulted in a loss of \$370,578 in 1927 and a total loss of \$861,470 since the installation of bus service 29 months ago. Incidentally, 21 out of 35 car lines are unprofitable at the present time, since many of the car routings are archaic. But the company must perforce continue to let Wade Park cars perambulate over the east end, Clifton Boulevard cars amble alongside a bus route, and the East 105th Street cars meander along a narrow street parked with vehicles. Moreover, if the city continues indefinitely to regulate and prescribe service as it did nearly twenty years ago without first restricting the real dictator of service, traffic congestion, it will receive a decreasingly effective service at a constantly increasing cost.

These are the most obvious things that call for correction. Recent discussions of them have not been without attendant hysteria over the outlook for the future, *Finance and Industry* even raising the question, "Is the Tayler franchise a failure?" and *Greater Cleveland*, devoting a whole issue to transit, heads its review, "Council Must Act on Transit Problem." There, it seems, is the answer. The Tayler franchise is a human document subject to political procrastination. That seems to be the point. The Cleveland franchise has worked since 1909, not always with the celerity that might be desired, but it has worked. The idea on which it was founded is just as sound today as it was the day the grant was drawn. That questions arise under it which at the time appear serious is not a fault of the grant. The fault is with the agency that is indifferent. That agency in this instance is the Council. The company, Railway Commissioner Ballou and the committee which considered suburban fares appear to be agreed upon the course of action that should be followed. On this and other matters the Council needs to be spurred into activity.

Cincinnati Installs Full-Automatic Supervisory-Controlled Distribution System

By **Harley L. Swift**

Superintendent of Substations Cincinnati Street Railway, Cincinnati, Ohio



Colerain Avenue substation, one of the nine new 60-cycle stations built in Cincinnati

The architectural treatment of each building is adapted to its surroundings. At the right is shown the standard method of bringing feeder cables out of the building. The feeder rack is not completed.

BY JULY, 1928, the Cincinnati Street Railway expects to have completed the rehabilitation of its entire power distribution system. The rehabilitated facilities will include nineteen full-automatic, 60-cycle, synchronous-converter substations, with supervisory control from a central load-dispatching office adjacent to the Walnut substation. This is the most extensive supervisory controlled automatic installation ever undertaken on a city distribution system and includes many novel features to provide flexibility and to insure safety and freedom from service interruptions. When completed the railway expects its distribution installation to be the most reliable and economical that the development of the art will permit.

Eleven new substation buildings have been erected, three buildings have been completely remodeled into substations and five present substation buildings have been partly remodeled. As outlined in the Jan. 21 issue of *ELECTRIC RAILWAY JOURNAL*, the rehabilitation program includes the sale of the Pendleton steam power plant, abandonment of former 25-cycle substations and purchase of all power at 13,200 volts from the Union Gas & Electric Company.

Complete redesign and rehabilitation of power distribution facilities will provide most extensive supervisory controlled automatic system ever installed on a city property. Nineteen automatic stations give efficient power distribution under supervision of central dispatcher

Locations of the new, rehabilitated and abandoned stations are shown in an accompanying map of the system. The three stations in the congested area will each have two 1,500-kva. converters; the intermediate ring of stations, ten in number, will each have one 1,500-kva. converter. Beyond these is an outer ring of stations having one 1,000-kva. converter each, and a 200-kva. unit on the Milford interurban line. The total machine capacity of the new system will be 29,200 kw. Bearing in mind the proposed Cincinnati rapid transit system which has been under discussion for many years and which is partly completed, and the future growth of the city, provision for increased power has been made by allowing space for an additional unit in each of six of the stations—Walnut, Kenton, Brighton, Colerain, Mitchell and Westwood.

NEW SYSTEM USES 60 CYCLES INSTEAD OF 25

Under the old system 25-cycle power was generated at Pendleton power house, a steam-turbine plant of about 20,000-kw. capacity. This power was distributed at 6,600 volts although all equipment was adaptable for 13,200 volts to five synchronous converter substations—East

End, Hyde Park, Blair, Avondale and Brighton—and converted to 600 volts direct current. Power at 13,200 volts, 60 cycles, was purchased from the Union Gas & Electric Company at seven synchronous converter substations—Price Hill, Hartwell, Norwood, Walnut, Cumminsville, Depot and Miami—the three first named being

The outstanding feature of the supervisory control system being installed is the full knowledge the dispatcher has at all times of every important function in each station. The stations are completely under his control so that he can transfer loads from one station to another as load limitations or economy dictate, or should



New power distribution system of the Cincinnati Street Railway

All stations are full-automatic with supervisory control from a dispatcher's office adjacent to Walnut station. The location and capacity of each station was determined through the use of spot maps showing car distribution in peak periods.

full-automatic stations. There was a 1,500-kw., 60-cycle, synchronous converter at Avondale using purchased power, and a booster set at Brighton to help out during peak loads. The total substation capacity of the system was about 30,000 kw.

NO CHANGE IN TOTAL CAPACITY OF SUBSTATIONS CONTEMPLATED

With the new system the total capacity is practically the same as with the old, the difference being in number, capacity and location of the stations. These are now relatively close together, the average distance between them being about 1 mile. The location and capacity of each station was determined from spot maps showing car distribution throughout the city during peak loads, and a knowledge of energy consumption of cars when loaded and on grades. The new station locations will give far better voltage and lower line losses throughout the system.

the fire chief order lines cut out in a fire area the dispatcher can do so instantly.

Should anything happen to the supervisory control system for any station, group of stations, or all of them, those affected will at once function automatically, except that any device locked out by the dispatcher prior to the disruption will remain locked out until released by a visit to the station.

An average of 2½ seconds is required to establish a control circuit in the supervisory system. The actual operation of the devices and check-back indications is instantaneous, so that the time required to complete any cycle is determined by the speed with which the dispatcher can push the control buttons. To provide a permanent record of loads and to afford a means for analysis of the opportunity for economy, the bus voltage for each station and the ampere load on each converter on the system are recorded in the dispatcher's office by indicating and recording meters on each station panel.



Elmwood substation, which will normally operate as one of three grounded-return stations, but is so located that in an emergency it can feed an ungrounded return or double trolley division

For the circuits of the supervisory control system, four pairs of wires run from each of the nineteen stations directly to the local dispatcher's board, which has a panel for each substation. Two of the four pairs of wires from each station are for remote metering and a private telephone system. By means of buttons on each control panel the dispatcher may at will (1) start or stop each converter; (2) release each converter to automatic operation; (3) open or close each incoming line oil circuit breaker; (4) open or close each d.c. feeder; (5) release each d.c. feeder to automatic operation.

Through red, white and green lights the dispatcher has continuous indication of the following: (1) Whether each converter is running or stopped; (2) whether load-limiting resistor contactors are open or closed; (3) sequence of starting for converters in double unit stations; (4) availability for service of each incoming a.c. power line; (5) position of each incoming line circuit breaker; (6) position of each d.c. feeder breaker; (7) whether the station control battery is being charged; (8) that the station lockout circuit has shut down the station; (9) whether the station door is locked or unlocked.

The dispatcher can start any station independently of its automatic functioning by turning a key and pulling a button on the panel controlling it. Within five seconds he will have completed a circuit between his board and the relay to be operated at the station. A yellow light will appear on his board, which indicates to him that the circuit has been completed correctly right up to the relay at the station. Having received this check light he can close the relay through a second button, and a red light indicates that the connection has been made correctly.

If, while the dispatcher is engaged, some automatic device in any substation operates, his attention is called to it audibly by the ringing of a bell and visually by the appearance of a white light at the top of the panel for that station. At the same time the signal light indicating the device on the panel changes in color from red to green or vice versa, and a white light appears beneath. The white lights go out when the dispatcher acknowledges the signal by pushing a "clearing button" on that particular panel. Should several devices function simultaneously the signals are "stored" and sent in succession as the devices function. Thus the dispatcher is advised of every change occurring in each substation.

After a study of the present and future possibilities of the territory surrounding each station, a building was designed whose exterior not only would harmonize with,

but would be a distinct credit to, the locality. No two of the buildings are alike. The grounds about the stations will be carefully and beautifully landscaped.

Since many of the buildings are in residential districts, attention to the matter of eliminating objectionable features did not stop with attractive exterior architecture. Every effort was made to reduce noise and to make the stations as nearly soundproof as possible. The converters are mounted on 3 in. of Armstrong machinery isolation cork. Except for the main door and an emergency rear exit, there are no openings in the building above the ground line. The inside faces of the walls are 8-in. Insul glazed tile.

VENTILATION SYSTEM EMBODIES LATEST RECOMMENDATIONS AND DEVELOPMENTS

Particular attention was given to the ventilation of these buildings. The latest A.E.R.A. and other recommendations and developments are to be found embodied in them. All air enters the building below the floor line, and passes up through floor gratings at each end of the converters, under the transformers, and under the load-shifting resistor bank. A chimney leading from each converter pit through the roof conducts to the outside the hot air discharged downward by the converter. A 66-in. Robertson ventilator is mounted on the roof above each converter for the hot air discharged upward. There is an opening to the outside atmosphere of 400 sq. ft. in the half cellar under the converter side of the building. Another opening of 40 sq. ft. area from the outside feeds cool air to the grating under the transformers, and two or three 30-in. ventilators, depending on whether the station has one or two units, are placed directly over the transformers. This arrangement allows



Interior view of station showing load-shifting resistor mounting, floor grating and side wall louver near ceiling for ventilation

cool air to enter at the transformer base and to flow upward along the tubular radiator pipes, cooling them and passing out through the roof ventilator. The load-shifting resistors are mounted on the wall between two pilasters directly over a floor grating, the cool air coming up from the half basement, passing through the resistor and discharging outdoors through movable copper louvers in the wall above the resistors. The mean height of the buildings above the floor is 23 ft., which is not only an aid to ventilation but is a help in deadening the operating noises.

To facilitate maintenance, the new buildings have been designed and the old ones remodeled so that the arrangement of equipment in each station will be as nearly alike as is possible. Typical sections through single and double

High-tension bus structures are of "Deceleco," a fibrous compound of gypsum. The structures were made and installed by Deceleco, Inc., Wayne, Mich.

Transformers are of the outdoor, tubular-radiator, oil-cooled, three-phase, high-reactance core type with interleaved disk windings. As previously mentioned, however, they are installed inside the station buildings. Primary taps may be changed by an operating lever extending through the cap plate. Low voltage leads are brought out the side through weatherproof bushings.

The 1,000-kw. and 1,500-kw. synchronous converters have speeds of 900 r.p.m. and 720 r.p.m. respectively. They are capable of 150 per cent load for two hours and 200 per cent load momentarily. They may be operated without undue heating either as full compound machines



Interior of Colerain substation, showing typical arrangement of station equipment, provision for additional unit and "Deceleco" bus cell construction. The transformer is located behind the switchboard at the right

unit stations are shown in accompanying illustrations. All apparatus is located indoors in one large room on one floor, with the exception of the control and supervisory storage battery, the air compressor and the negative bus structure, which are in the basement.

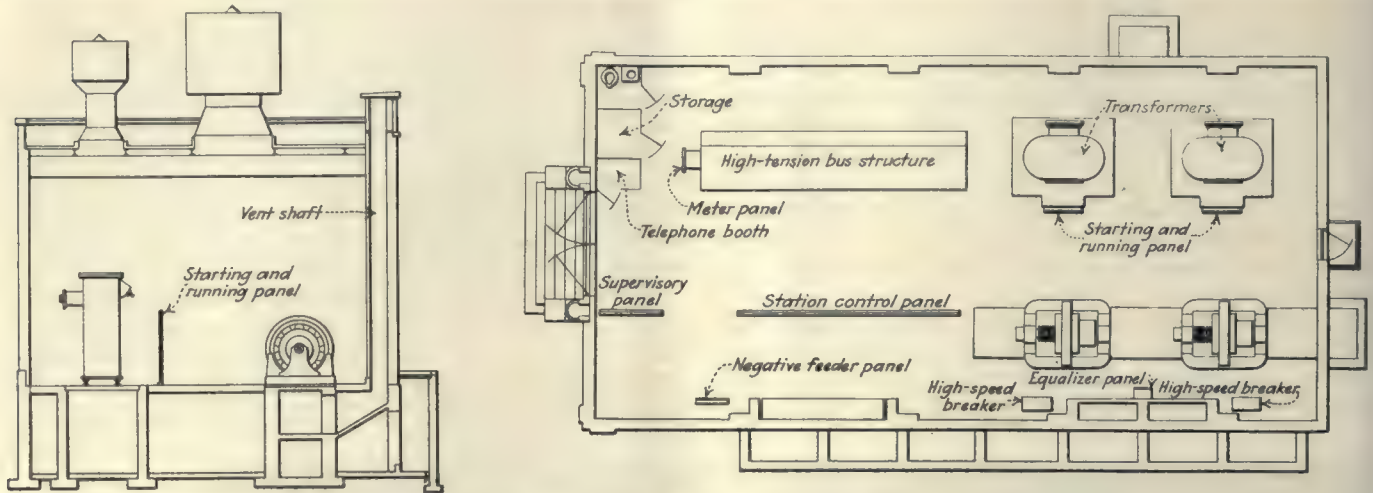
The incoming a.c. power lines come through underground ducts, and the outgoing d.c. feeders go through a tunnel to the curb line and are brought out to overhead feeders through vertical pipes mounted around the feeder pole. Double-unit stations have two incoming 13,200-volt, 60-cycle, a.c. power lines, and single units one incoming line. The Union Gas & Electric Company delivers power and maintains the lines as far as the pothead in the cell structure, which also houses disconnecting switches, potential, current and control transformers and the main oil circuit breakers. The lead-covered cable from the cell structure to the transformer enters the latter through side-type oil-filled potheads, so that no high voltage conductors are exposed.

or as full shunt machines or anywhere between, by adjustment of the series field.

High-speed breakers in the negative sides of each converter open in 0.007 second. This precludes a high value of current before the converter is cut off the bus. Aluminum bar is used for the negative bus and for interconnections between the load-shifting resistor units and the contactor groups. A 30 per cent saving in cost over copper despite use of additional bars, and the light weight of the aluminum, were factors determining its use.

Automatic reclosing circuit breakers have been installed on each of the 87 feeder circuits. These breakers open on short circuit or severe overload. When this happens, relays immediately feel out the circuit, and so long as the trouble remains on the line the breakers stay open. As soon as the trouble is cleared these relays cause the breakers to reclose.

Due to the double trolley system used in Cincinnati, the Elmwood station presents an interesting problem;



At left—Section-through typical single-unit automatic railway substation in Cincinnati
At right—Floor plan of typical two-unit substation

normally it is one of three stations with grounded return, but it is so located that in an emergency it may be called upon to feed an ungrounded return, or double trolley division. The load dispatcher, through the supervisory system, can make this change-over readily, as an interlocking arrangement makes it impossible to throw in the ungrounded breakers while the station is operating on the single trolley with grounded return and vice versa. The station functions automatically on either return.

FLOOD DISTRICT REPRESENTS SPECIAL PROBLEM

The Lincoln station, located in the flood district, has been constructed as a veritable concrete bathtub. The entire foundation is waterproofed with a $\frac{3}{4}$ -in. Carey fibrous asphaltic preparation and lead sheathed cables are used instead of varnished cambric flameproof cable.

Substation buildings are normally lighted with 110 volts a.c. from the control transformer, but there is an emergency 600-volt d.c. series lighting circuit so that for cleaning and inspection the high-tension circuits can be

disconnected at the incoming pothead. The storage battery feeds one ceiling lamp near the door and two extension cord outlet plugs, one at the end of the switchboard and one in the basement.

An inclosed booth houses a telephone on a direct line over the supervisory cable to the dispatcher's office. Through it communication may be had with any other station. A Bell telephone also is part of the equipment of every station. There is a tool storage room and toilet in each building.

The Union Gas & Electric Company has installed the most recent type of metering equipment. Two outstanding features of these instruments are: (1) Power can be off 50 consecutive hours without affecting the accuracy of the meter; and (2) the silver stylus and impregnated paper chart not only do away with ink but give a clearer, more pronounced and more accurate reading than was heretofore available. One of the accompanying figures shows this Landis & Gyr meter.

The Colerain station was successfully placed in service March 12, Westwood April 5 and Hyde Park April 25. Lincoln, Depot, Delta and Kenton Stations will go into service early in May. Present schedules call for completion of the entire system by July 1.

All electrical equipment was furnished by the General Electric Company. Practically all of the 60-cycle equipment already in service has been utilized in the new system. The Collier Construction Company of Cleveland installed the electrical apparatus in ten of the new stations, while the Cincinnati Street Railway's forces handled the work at the remaining nine stations, five of which maintained partial operation during the changes.



Landis & Gyr Maxigraph meter and panel



Basement view of Cincinnati substation showing negative bus structure and method of carrying feeder lines to street



One of
the 80-ton
locomotives

South Shore Line Builds Attractive Freight Service

New stations, larger loading platforms and double-end sidings speed the service. Overnight delivery of l.c.l. freight popular with shippers

CENTRALIZED shipping and receiving facilities for the growing freight business of the Chicago, South Shore & South Bend Railroad, are provided by a freight merchandise station opened in South Bend, Ind., last month. The station embodies many new features in design and construction.

The over-all ground dimensions of the building are 28x90 ft., including a 10 ft. eave overhang on each side of the loading platform to protect against storms. The structure is built of Stefco steel with fireproof creosoted pine floor and corrugated steel apron reaching to the ground around the entire building. The office section has, in addition to the headquarters for the freight agent, a heated room for storage of perishable goods in cold weather and a room for valuables. The office part of the building is also constructed of Stefco steel, lined with

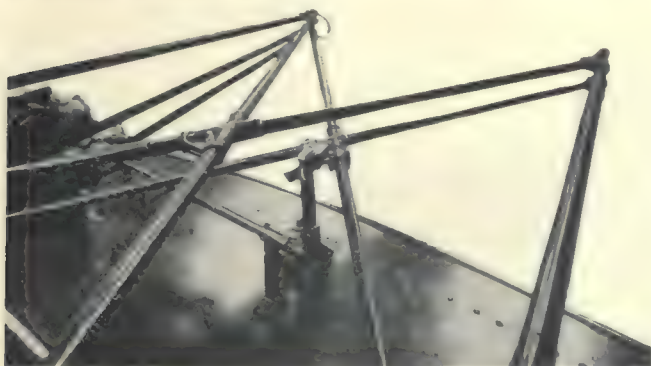
Celotex sheathing and given a pleasing, yet practical, interior appearance.

The loading platform is inclosable with vertically sliding doors, designed and built in the Michigan City shops of the South Shore line. Eighteen of these doors are provided, making it possible to expose the entire platform. At one end of the platform is a built-in loading scale with concrete foundation.

Freight business of the railway, since the reorganization, has already shown a remarkable growth under an active corps of traffic experts who were put to work on the freight problems of shippers in the territory. Reference to the building up of this business was made in *ELECTRIC RAILWAY JOURNAL* for Nov. 5, 1927, page 852, and Nov. 12, page 901. Extensive improvements were made in the facilities for handling freight, among them



The South Shore freight station at Gary, Ind.



Pantograph locking device on top of cab

being the remodeling and building of larger station platforms and construction of the South Bend freight station.

In addition to rehabilitating the road from end to end, passing tracks already built were lengthened and additional ones were constructed. Portions of the line were double-tracked in order to improve the handling of traffic, which was increasing in volume from month to month. New interchanges were constructed, with the Belt Railway Company of Chicago at Hegewisch, Ill., and the Wabash Railway at Gary, Ind. In addition, the interchange track maintained with the Nickel Plate Road at Michigan City, Ind., was doubled in capacity.

The present South Shore Line management realized at the outset that the establishment of working arrangements with other lines was imperative. Heretofore rates were in effect with only a few lines, and many confusing restrictions existed in tariffs. The South Shore Line has gone steadily ahead in this important branch of traffic work. Rates have been established with a large number of lines on a competitive basis and today it is in a position to give shippers and receivers of freight a service and rates in line with those of other roads.

Four receiving stations for freight were established at vantage points in Chicago and an overnight delivery policy was inaugurated. Freight taken to the receiving stations before late afternoon is transported to stations on the line ready for pick-up the next morning.

The South Shore Line has an advantage over some other electric railroads in that standard freight cars can

be handled over the entire line from Kensington, Ill. to South Bend, Ind. Through the activity of its freight solicitors and traffic agents, interchange and switching facilities have been established with several of the nearby steam lines and other arrangements are pending.

Through rates have also been established with several steam lines and other tariffs are being worked out. Private switching tracks have been built for several new industries and others have been laid for some of the old established industries.

Another problem to be overcome was that some of the industries closer to Chicago trucked their l.c.l. freight to that city. The fast overnight service of the South Shore Line and lower cost are rapidly overcoming this competition. Large freight receiving stations are maintained in each of the cities served. Tracing of delayed shipments by wire, close personal contact between South Shore Line solicitors and traffic agents of the shippers, courtesy and modern appurtenances are among the factors contributing to the freight increase.

SIX LOCOMOTIVES HANDLE THE BUSINESS

The freight handling equipment consists of six 80-ton Baldwin-Westinghouse electric locomotives, four put in service a year ago and two received the latter part of March this year. Each can haul trains in excess of 1,500 tons on comparatively level sections of the system, the weight of the train being adjusted according to the grades. Short stretches of heavy grades exist between Kensington and Gary. The locomotives can be operated in multiple, providing a considerable range in tractive effort, and will have a combined total output of 3,200 hp.

The steeple type cab is carried on swivel trucks. The rigid truck bolster is of cast steel bolted to the side frames. Hangers from this rigid bolster carry through semi-elliptic springs, a spring bolster. The cab is thus spring-supported on the truck frames, which are in turn spring-supported in the usual manner from equalizers on the driving boxes. Each truck has spring-mounted side bearings. The cab underframe is built of heavy rolled steel channels, the side and transverse members being connected by knee castings. Heavy end bumping and coupling castings are bolted to the longitudinal underframe channels.



LaSalle Avenue freight station in South Bend, Ind.

PRINCIPAL DIMENSIONS, WEIGHTS AND RATINGS OF SOUTH SHORE LINE LOCOMOTIVES

Axis classification	B-B
Motors, axle mounted:	
Maximum speed	45 m.p.h.
Total weight	160,000 lb.
Horsepower—one hour short field	1,600
Tractive effort—one hour full field	29,200 lb. at 18.6 m.p.h.
Tractive effort—continuous full field	17,200 lb. at 21.7 m.p.h.
Driving wheel diameter	42 in.
Rigid wheelbase	104 in.
Length over bumpers	434 in.
Length between coupler knuckles	39 ft. 4 in.
Length over bumpers	36 ft. 2 in.
Height, top of rail to roof	12 ft. 1½ in.
Total wheelbase	27 ft. 0 in.
Rigid wheelbase	8 ft. 8 in.
Truck centers	18 ft. 4 in.
Width over all	10 ft. 7 in.

The two trucks are each equipped with two Westinghouse type 358-D-5, 750-1,500-volt field control, forced-ventilated motors, with single-reduction spur gears, having a ratio of 16:72. Current collection is provided by a spring-raised, air-lowered, double-shoe pantograph.

The master controller, which operates on a 32-volt circuit, contains nineteen notches, ten in series and nine in series parallel. There are four economic running positions, namely, full and short field connection in both series and series parallel.

Each locomotive unit is equipped with a 2½-kw., 1,500-32-volt motor-generator set and an auxiliary battery. The motor-generator set is interchangeable with the sets employed on the motor cars of the system and the method of operation is similar. The two blower sets employed per unit consist of a 1,500-volt motor driving a Sirocco fan. The equipment is mounted on each end of the locomotive and supplies air to each end of a com-

mon duct running the entire length of the locomotive. A baffle is provided at the mid-point of the air duct. Under ordinary operating conditions this baffle is closed and each blower supplies air to the two motors nearest to it. In the event of a failure of one blower equipment the baffle can be opened and the air duct closed at the end adjacent to the blower motor which is out of commission.

Two 53-ton switching locomotives also were purchased and are being used in switching and incidental service.

Western Ohio Revamps Interurban Cars

WITH the present trend toward de luxe service and a desire to furnish more comfortable and attractive rides, the Western Ohio Railway has recently remodeled seven of its light-weight interurban cars. As these cars were comparatively new they were not rebuilt, but the interior was refinished and composition rubber tile flooring laid to harmonize with it. The passenger compartment has chair type seats covered in striped velour arranged in pairs on each side of the aisle. In the smoking compartment the interior finish is similar, except that the seats are leather covered.

Each of the seven cars is painted a different combination, using bright colors with two-tone pennant front dash design. The name of the car is in the center of



Bright colors are used to give an attractive appearance to the outside of the cars. The striped velour seats and rubber tiled floor give a pleasing interior

the side, flanked on each side by the company insignia. Each car is named after a president of the United States.

The Western Ohio Railway has received many favorable comments on the changes, indicating that the remodeled cars are meeting with the general approval of the riding public. In addition, two new equipments each consisting of four Westinghouse type 333 motors and HLF control were purchased.



Public Relations Man Plays an Important Role

By J. J. Davies

Assistant to the President Philadelphia Rapid Transit Company, Philadelphia, Pa.

Philadelphia Rapid Transit Company's public relations department serves in a dual capacity. It represents the company in all dealings with the public and at the same time champions the car riders with the operating departments



The P.R.T. public relations department renders a 24-hour telephone information service

WHAT sort of a "critter" is a public relations man? Five years ago there was scarcely such an individual in existence, at least in the transportation industry. For instance, while the public relations department of the Philadelphia Rapid Transit Company is a rather complex structure because of its association, direct or indirect, with every company activity in which public contacts are involved, it was not long ago that no such set-up was in existence. Public complaints were handled directly by the transportation department, there was no definite advertising policy, every operator made his public contacts according to his own judgment and inclination. The riding public lacked within the company a sympathetic auditor to whom it could take its troubles and know that they would be given intelligent and effective attention. And so, due to lack of attention, many troubles which were largely imaginary or at any rate easily adjusted, assumed extraordinary proportions.

Today all that is changed. An organization has been built up of trained men, experienced in all of the phases of public dealings that may occur in a co-ordinated transportation system such as the Philadelphia Rapid Transit Company. These men are charged with the responsibility for handling complaints, advertising, publicity, dealing with civic organizations, investigating conditions leading to requests for increased or altered service, running a well-equipped information bureau and the lost and found department, meeting the public more than half way at every conceivable point.

It is in a dual capacity that the public relations department serves. Not only does it stand behind the sales counter in marketing the transportation wares of the organization; it also stands ready at all times to carry the just pleas of the car-riding public before the operating heads and to request that they show cause why those pleas should not be recognized. Obviously, a delegation of citizens could not sit in the transportation con-

ference and argue in favor of their several needs. But the public relations department is constantly rubbing shoulders with civic associations, newspaper editorial writers, individual petitioners and similar representative units in the community life; it knows what the public wants, what it is justified in seeking. So it is that the car rider has a champion at court, an intermediary that is able to analyze his needs and present them to the management in a favorable light. If at the time those requests of the public cannot be granted in toto, then the why and the wherefore are frankly explained by the public relations contacts.

As the work of this service bureau becomes more generally known and understood throughout the community, it adds immeasurably to the good will existing between the company and the public. Also, this better understanding adds materially to the work and to the responsibility of the public relations department.

A transportation company which has not at present a definitely organized public relations department might be inclined to ask: "How large and how comprehensive a set-up would be required to handle our own dealings with the public?" The answer to that question, of course, depends on the size of the company and the community which it serves, the nature and extent of its operations, and the energy and resourcefulness of the individuals chosen to undertake the job. One live wire, with the right personality and a proper understanding of his work, could accomplish wonders for a small property.

But when the situation is similar to that in Philadelphia it is more complex. The Philadelphia system embodies street cars, subway and elevated lines, motor buses, both city and intercity, and a large fleet of taxicabs. Naturally, these diversified activities introduce widely varying problems of public service.

The constituent parts of the public relations organization are closely allied, and tie in closely with the recently created new-business department, whose specific function is to follow through the various new-business leads developed by the other units.

While there is this close tying in between the various units in the public relations department, each division has its particular functions and responsibility. For example, advertising and publicity are handled by men who, by virtue of earlier experience in newspaper and trade journal work, have the peculiar viewpoints necessary. With the advertising and publicity work is combined the responsibility for all of the printing incident to the production of company publications, read-as-you-ride folders, direct-mail material, notices of service changes, and the like. This printing activity alone entails an annual expenditure of approximately \$80,000.

The group of individuals who handle passenger complaints, contacts with civic organizations and similar matters, have been specially trained to analyze and to determine the justice of requests for added service and the practicability of granting them. The men who compose the staff of the information bureau have served formerly as trainmen and, through long association with the complex transit system of the city, have gained

the knowledge necessary to answer almost any conceivable question concerning transportation facilities.

These are only examples of the groups of specialists who make up the public relations department. There is one thing every member of the organization has in common—a deep-rooted appreciation of the public's viewpoint, a desire to render a well-rounded service to those who seek their assistance. They are the salesmen de luxe of the organization, seeking to put over the idea of service with both riders and company employees.

SALESMANSHIP AN IMPORTANT FUNCTION

The actual day-by-day salesmen of the organization are the trainmen, the bus operators and the cab drivers. They are the ones who ultimately must please the customers and convince them that the goods offered are the finest obtainable and not to be rivalled by the home-spun material, i.e., the private automobile. The public relations staff might be likened to the window dressers, the experts who have a highly developed sense of practical psychology and who have learned to array their display in the most favorable light.

Advertising of such a commodity as public transportation, generally speaking, directs attention to the advantages presented by the services of a particular company. Publicity follows the advertising through, supplements it, and helps the public to keep in mind the realization that the company is ever ready to

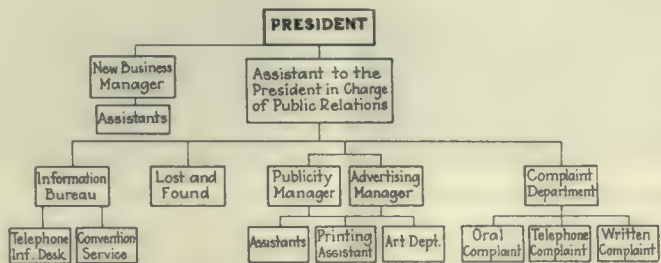
convey its patrons wherever their destinations may be.

Both of these specialized functions would avail little or nothing if the rank and file of conductors, operators and drivers, failed to accomplish their mission as personalized salesmen. No more would they be successful if the articles sold—in this case, car, bus and cab rides—failed to measure up to the standard of quality advertised by the company and demanded by the customers.

It easily may be seen, then, how important it is that the goods are first "as advertised"; second, that the salesmen who actually come into daily contact with the public realize the value of their wares and look upon themselves as joint proprietors in the business, and third, that these employee-owners receive the best possible backing up from the public relations department.

It is even more important to sell the men on the true significance of their jobs than it is to sell the public upon the merits of the service. To that end the public relations group is charged with the editing of the P.R.T. *Co-operator*, the medium of contact between management and men, and incidentally, a medium whereby the gospel of salesmanship, courtesy and efficiency may be sold to the more than 15,000 employees in the organization.

In addition to this direct contact, the public relations department, through following up complaints against individual employees on the grounds of discourtesy, passing up passengers or other marks of an unsalesmanlike attitude, helps to bring about a better understanding on the part of the employees of how to deal with the public. When repeated complaints are lodged against an employee, he is reinstructed in the elements of salesmanship, and if he still provokes complaints he is discharged.



Organization chart of the P.R.T. public relations department



Taking the details of a complaint. A few complainants call in person at the office, but the majority write or telephone

Not the least important duty of the members of the P.R.T. public relations department is to place themselves upon a basis of reasonable understanding with leaders in the various communities encompassed by the metropolitan area of Philadelphia. When there seems some likelihood that a misunderstanding concerning the prospective activities of the company may arise in a particular section, extraordinary pains are taken to reach the important organizations in that community and to win their support of the move.

CONTRACTS WITH CIVIC AND COMMUNITY ORGANIZATIONS ARE CAREFULLY MAINTAINED

Whenever an opportunity presents itself to provide a speaker for a luncheon club or some other organization which has a real interest in transit matters, that opportunity is eagerly seized upon by the public relations department. Its own members, and others of the official family of the company, have heretofore done most of the speaking in public, but efforts are now under way to develop a speakers' bureau that can function in a more comprehensive fashion. The membership of this bureau will be recruited from both sides of the employee-employer family, individuals who have a natural aptitude for speaking and who would find real pleasure in carrying the viewpoint of the company to the man in the street.

Another important contact is the community newspaper, the weekly publication devoted to the interests of a particular section. More than 40 of these papers are published within the Philadelphia area and their influence is constantly on the increase. They fill a need which of necessity the great city daily newspaper must ignore. As a consequence, their friendly co-operation with the transit organization is much to be desired.

Whenever a general advertising campaign has been under way, the advertising department has made it a

policy to place generous displays in all of these publications which are accredited news organs. Needless to say, the small weekly publications are more appreciative of such co-operation than are the metropolitan dailies. The many small voices speaking in fairness occasionally reach more ears and carry more weight than the one stentorian voice crying anathemas.

HOW COMPLAINTS ARE HANDLED

People who have a bone to pick with the company do that picking in three ways; they call in person at the public relations offices, they telephone or they write. By far the greatest number adopt the latter method. Complaints cover every imaginable type of grievance, real or fancied, and every one is given the most exacting attention.

Occasionally the cynical opinion is expressed by some member of the public that it is of little use to make complaints to the company since these documents are probably consigned to the wastebasket. Actually, however, the most meticulous care is observed in examining the merits of each case, with a view to settling it in a manner that will be satisfactory to the complainant and of value to the transit organization.

When a complaint letter arrives at the public relations office it is immediately acknowledged, the complainant being assured that immediate and effective steps will be taken to remedy service conditions, to discipline erring trainmen, or to meet the situation outlined in the letter, provided that the complaint seems reasonable and justified. However unreasonable it may be, it detracts not a bit from the courtesy of the reply.

It is interesting to note that a certain number of almost professional "kickers" are always in evidence. Month after month complaints roll in from these grumblers, most of them inconsequential and frequently unjustified, yet never does the tact and diplomacy of the

complaint handlers fail them. One of the prime requisites for the man who is to conduct public relations work successfully is the "patience of Job."

After the complaints, oral or written, have been acknowledged they are referred to the operating departments and such disciplinary or remedial action is taken as is justified. A report is then made to the public relations department, so that each complainant may be notified as to what action has been taken or is being planned. If it is not found possible to follow his suggestions the company's position is carefully explained, so there may be no reasonable ground for the feeling that the company is insincere in its attitude.

Only in the event of disciplinary action against employees is an exception made in giving the full details to the complainant. Then the customer is assured that appropriate steps have been taken to prevent a recurrence of the conditions with which he or she found fault. The trainman may actually be put on the extra list, or even discharged, but it is believed that no good comes from giving these details to the public.

A RESEARCH LABORATORY FOR IMPROVING SERVICE AND GOOD WILL

Important among the several functions of the public relations group is that of securing data on possible ways of adding to the efficiency and attractiveness of the service. This, in turn, will have its effect in improving the good will existing between the company and the public.

Periodic canvasses are made of the large industries in and about Philadelphia to determine whether or not the transportation needs of the employees are being adequately met. The stockholders of the transit system are asked from time to time to suggest ways and means in which the service and good will of the company may be improved. Close contact is maintained with the public and parochial schools of the city, for the transportation of school children is a most important element of the company's service and it is essential to know how this responsibility is being discharged.

Detailed records are kept of all types of complaints and commendations received, so that a monthly chart may be prepared. A check of these monthly charts over

a period of years shows an encouraging downward trend in the volume of complaints received involving discourtesy, inadequate service, passing up passengers—in fact, all along the line.

SERVICE BUREAUS MAKE FRIENDS FOR THE COMPANY

Such functions as the lost and found department and the telephone information service are integral parts of the public relations set-up. They are essentially there to render the extra degree of accommodation, the unexpected bits of service, which go so far in making friends for the entire organization.

The lost and found department is centrally located in the Mitten Building, accessible to the greatest number of people. It represents every branch of the P.R.T. service and lost articles are forwarded there with unusual speed and surprising frequency.

The telephone information service renders a 24-hour per day assistance to the individual who wishes to know how to get from where he is to where he wants to go. Questions are not confined to transportation; far from it. The information men are expected to know when Sunday school begins in the "so-and-so" church, when Colonel Lindbergh is expected to arrive, or where the best place is to get a bargain in used cars. It requires an inspired memory and a fertile mind, does the information desk.

Whenever a large convention arrives its directors may avail themselves, if they so desire, of the services of a trained information man to assist the delegates about the city and to provide them with whatever information on historical or industrial Philadelphia they may desire.

In addition to these various direct services, the company takes pains to give printed notice of impending service changes, temporary or permanent reroutings, etc., prior to the dates when those changes are scheduled to take place. These notices take the form of car cards, pole signs, and "read-as-you-ride" folders, which are distributed in boxes provided in all cars, buses and taxicabs.

SPECIAL CAMPAIGNS TO BUILD GOOD WILL

Entirely aside from the normal routine of the public relations work has come, from time to time, the conducting of a special advertising and feature campaign, de-



At left—Retrieving a possession from the lost and found department, located in the basement of the Mitten Building. At right—Section of the lost and found department, showing the great number of articles returned and how they are cared for

Militancy Made This Road Pay!

ARKANSAS has known no electric railway abandonments. And of the roads in that state none is more interesting than the one in Little Rock, where many economies have been put into effect. Economy, however desirable at times, is but a negative virtue. One of the features in the JOURNAL for May 5 will be the story of how the company turned the tide of receipts with improved service, backed by an advertising campaign.

signed to forward the worthwhile phases of community endeavor, and in so doing to establish the company ever more deeply in the hearts of the general public. Such an effort was the "Will Livelong" safety campaign of April, 1927. Such, again, was the "80 per cent" campaign carried on during the past winter season to arouse the group consciousness of the car rider to the fact that he constitutes 80 per cent of the users of street space and yet is grudgingly accorded only a very small strip of the street area. It was not a slap at the motorist, but rather an effort to picture the traffic conditions of the city just as they exist today, and to suggest ways and means of bringing about at least temporary relief.

The expenditures required by such efforts as these have proved more than justified by the definite results obtained in quieting thoughtless criticism of the company in matters beyond its power to control. By explaining the position of the transportation system frankly and openly, public approval has been won increasingly.

Most recent among the efforts of the public relations department has been the winning of the approval of the management to provide for the instruction of all new employees in salesmanship and every-day public relations philosophy. Along with this goes the reinstruction of older employees who have been repeatedly cited for discourtesy and other evidences of the wrong viewpoint in dealings with the public.

A certain amount of this instruction was given in years gone by, but no great emphasis was placed on the matter and it naturally was taken rather for granted by the new employee. Now he is destined to go through a course which will speedily disclose his fitness to represent the company in its relationship with its customers.

Thus it may be seen that the public relations man plays an important rôle in the modern transportation drama. The importance of that rôle is becoming increasingly apparent. He knows what he's there for and he'll either convert every other member of the cast to his way of thinking, or be thrown bodily out of the stage door.

Ornamental Viaduct Spans Kansas City Highway

ONE of the projects provided for in the Kansas City Public Service Company budget for 1927 was the replacement of an old wood-trestle viaduct located at the intersection of Mill Creek Boulevard and 43rd Street in Kansas City, Mo., with a new concrete-steel structure. The new viaduct provides for a single track and is approximately 310 ft. in length between the abutment pilasters. It is used by the Dodson line of the company which operates in part over the company's Country Club line and furnishes freight service between the southern limits of the city and the Westport industrial district.

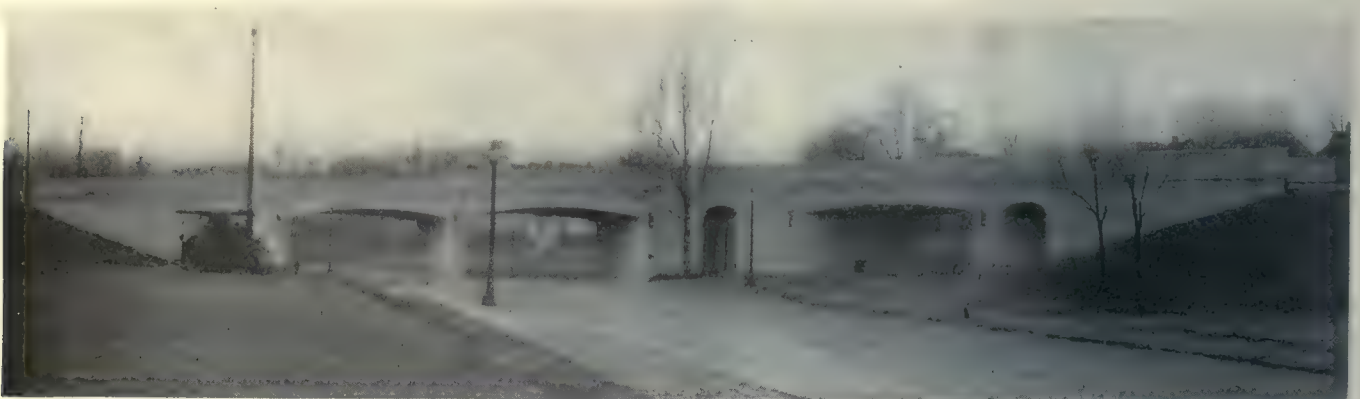
The ornamental structure was designed to add to the appearance of the boulevard it spans. An arch treatment was carried out, three large spans being provided in the length. Two of these are over Mill Creek Boulevard, where the roadway is 60 ft. wide, and the third over 43rd Street. Because double-deck buses operate on the boulevard, a clearance of 13 ft. 9 in. was necessary.

Each span consists of a concrete deck on steel beams supported by steel plate girders incased in the parapet walls. The intermediate sections and approaches are concrete decks on steel I-beams, supported on bearing walls and abutments. The design provides for an 80-ton electric locomotive with a train of 80-ton gross weight gondola cars, with an allowance of 30 per cent for impact.

The trolley poles are of the hollow-spun reinforced-concrete type and will carry a lateral pull of 2,800 lb. at the trolley connections.

A temporary trestle was constructed to serve during construction. It was used not only to maintain regular service on the line, but also as a work track for handling materials.

The viaduct was designed and constructed by William G. Woolfolk & Company, Inc., engineers and constructors, Chicago, Ill.



The Mill Creek Viaduct of the Kansas City Public Service Company adds to the appearance of the boulevard it spans

Maintenance Methods *and* Devices

Automatic Device Maintains Third-Rail Shoe Pressure

DIFFICULTY is often experienced in maintaining a proper electrical contact between the contact shoe and the third rail of the transfer table. This was true with the transfer tables in the inspection house and shop of the New York & Harlem Railroad, New York City, until an automatic pressure regulator for the transfer table third-rail shoe was designed. This is shown in the accompanying illustration.

Previously, when the wheel flanges and journals became worn or if the running rail or third rail were in any way distorted, due to climatic changes or mechanical defects, the electrical contact was lost entirely at certain points. The shoe support was fastened to the truck framing previously and the only adjustment was that allowed by the spring compression and shimming. The device designed eliminates entirely any need for adjustment by hand, since it is taken care of automatically at all times.

Two $\frac{1}{2} \times 1\frac{1}{2}$ -in. hinged straps are fastened to the underside of the transfer table platform at the proper distance from the center of the third rail. An oak plank 2x15x30 in., well seasoned and specially treated, is bolted to these hangers. A 25-lb. counterweight of 4-in. diameter and 8 in. long is suspended from a $1\frac{1}{2} \times 2$ -in.

hanger, 6 in. from the back of this plank. This weight forces the plank and contact shoe towards the third rail at all times by gravity and thereby automatically adjusts the shoe for any rail irregularities immediately. The shoe spring in use is the same as is being used on the plows for conduit rail, but the shoe is somewhat larger.

This arrangement has been in service for over a year and to date not a single failure has developed.

Welded Framework Truck for Welding Outfit

DUE to the destruction by fire of some of the housing facilities at the shops of the Jamaica Central Railway, Jamaica, N. Y., it became necessary to perform a large portion of the welding work in the storage yard. The rugged welding truck illustrated was built for the transportation of the welding outfit.

The framework is welded. All of the vertical and platform framework is made of $1\frac{1}{4}$ -in. angles. It is fastened to the $\frac{3}{4} \times 1\frac{1}{2}$ -in. axle by means of a $\frac{1}{4} \times 1\frac{1}{4}$ -in. iron bracket shaped to fit over the axle, the ends being welded to the framework. A platform for the support of the tanks is made of $\frac{1}{8}$ -in. sheet iron, welded to the angle framework. The vertical members are strengthened by $\frac{1}{2} \times 8$ -in. plates welded to the uprights. The handles are made from 1-in.



Welded truck to hold oxy-acetylene welding equipment

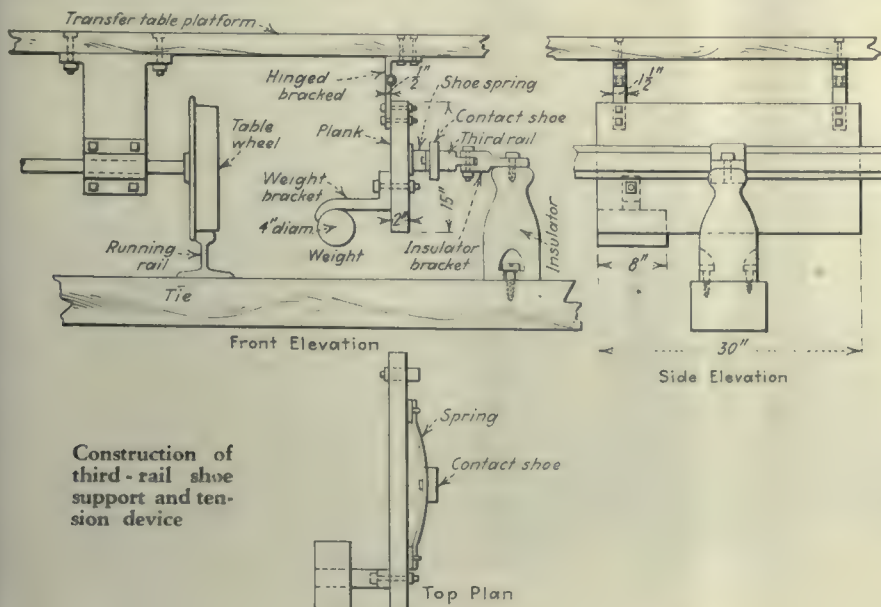
pipe, welded to the platform and vertical frame. Iron wheels of 10-in. diameter and 2 $\frac{1}{2}$ -in. face, spaced on 24-in. centers, provide for easy movement. The over-all width of the framework is 20 in. and the handles 21 in. The platform is 14 in. long from the center of the axles to the end of the framework, and the over-all height of the framework is 38 $\frac{1}{2}$ in. The tanks are held firmly by $\frac{1}{8} \times 1\frac{1}{2}$ -in. straps welded to the $\frac{1}{2} \times 8$ -in. reinforcing plate.

Making Removal of Cab Heaters Easy

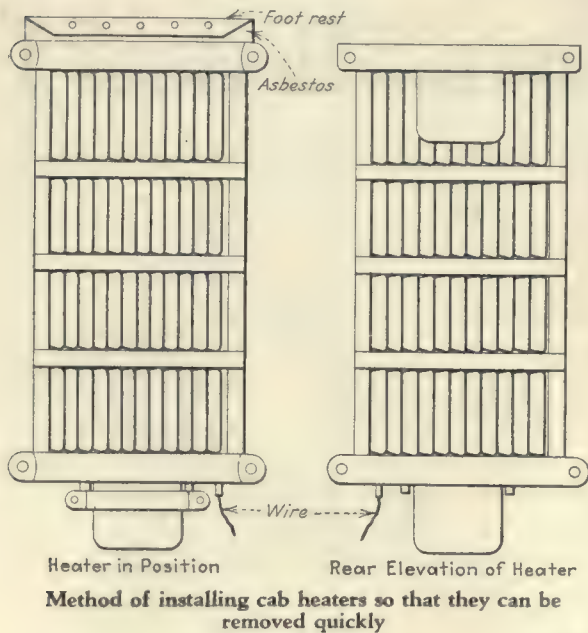
By BENJAMIN H. HALL
Shop Foreman West Penn Railways,
McKeesport, Pa.

WHERE individual heaters for motormen are used on the platforms of cars it is frequently desirable to remove them quickly for repairs. Where these are fastened permanently by four machine screws removal requires considerable time. In addition to this, when another heater is reinstalled frequently the drilling for the fastening screws varies so that additional holes must be drilled and tapped.

To provide a convenient mounting



Construction of third-rail shoe support and tension device



so that heaters can be removed and installed readily the West Penn Railways uses a clamping arrangement that has proved of particular value. It can be installed cheaply, and when a heater has an open circuit it can be removed by disconnecting two small two-way connectors for the leads and then can be lifted out and a new one set in place. Heaters cannot be changed in service.

Two brackets of bar steel $\frac{1}{2} \times 1$ in. are fastened to the inside panel of the cab and two other brackets are fastened to the heater. The brackets on the car form a pocket into which the heater brackets fit.

Portable Dryer Reduces Bus Painting Time

BUSES can be repainted in three days with a portable, electrically-heated drying shed, designed by James E. Dooley, master mechanic at

the Grand Avenue shops of the Connecticut Company, New Haven, Conn. The shed, which measures 35 x 12 ft. x 9 ft. 6 in., is made of 22-gage sheet steel with a frame of $1\frac{1}{2}$ -in. angles and weighs 2,800 lb. The sides and roof are of metal but the ends are of heavy canvas to permit easy opening. The shed is mounted on ten small wheels and can be rolled into position over a bus with little effort. Heat is furnished by ordinary car heater units, two rows of coils being mounted on each side about 2 ft. above the floor. The heaters are arranged in four 500-volt d.c. circuits and require a current of 50 amp. The temperature maintained in the shed for drying varies from 110 to 120 deg. F., which dries the paint quickly without cracking or checking. A small window in the side of the shed lets in light on a hygrometer and a thermometer so that readings of the temperature and humidity can be made at regular intervals.

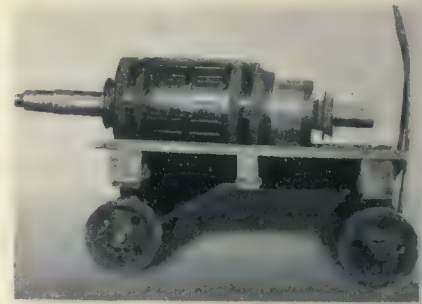
A bus brought in for repainting is thoroughly cleaned and dried in the shed during the morning of the first day. It then receives a coat of enamel and another drying in the shed. Late the first afternoon the bus is given a second coat of enamel and then is housed to dry overnight. The second morning it is striped and lettered, and again placed in the shed. The third morning it is varnished, completing the job. When thoroughly dry the bus is removed from the shop, all

ready to be again put in service.

With this apparatus a bus can be painted in three days, whereas the time formerly required was six days. Since the fixed charges on a bus are the same when it is in the shop as when it is in service, this effects a substantial monetary saving. This process is used for buses of the New England Transportation Company as well as for those of the Connecticut Company.

Armatures Are Moved Easily With Hand Truck

LITTLE time is lost in transporting armatures around the shop of the Binghamton Railway, Binghamton, N. Y., since a special hand truck was designed and constructed for this work. This truck, made of wood and steel, is 14 in. high, 18 in. wide and 33 in. long. The end timbers of the



Truck used in Binghamton for moving armatures about shop

platform framing are 4-in. x 4-in. oak and the center timber 2-in. x 3-in. oak, all being concave on one side to suit the diameter of the largest armature to be handled. Strips of 1-in. x $2\frac{1}{2}$ -in. wood fastened to these timbers form a strong support for the armatures and the curved surface prevents the armatures from rolling during transportation. The platform is strengthened further by $\frac{1}{2}$ -in. steel plates which are installed under each cross beam.

The front and rear axles are fastened to oak bolsters 3 in. thick. The rear bolster is held in place by bolts extending through the platform, end timber, reinforcing plate, bolster and axle. Additional strength is secured by two $\frac{3}{8}$ -in. x 1-in. braces extending from the axle to the center platform timber. The front bolster is held in position by a $\frac{3}{4}$ -in. king bolt which permits of easy rotating movement. Four 8-in. x $1\frac{1}{4}$ -in. cast iron wheels and a handle made of $\frac{3}{4}$ -in. round iron provide for easy movement throughout the shop.



Portable shed used in Grand Avenue shops of the Connecticut Company to speed up process of bus painting

New Equipment Available

Electric Gluepot

COMPACT glue-heating equipment that can be carried to the job instead of taking the work to the gluepot is announced as a new product by the Black & Decker Company, Towson, Md. With this equipment glue is maintained at a constant temperature of 150 deg. F. which is said to give the best working consistency for smooth, tight joints. The heating element is a Nichrome ribbon insulated with mica plates. The control is thermostatic. The glue container, which has a capacity of 2 qt., is cast aluminum, machined to fit a gray-iron receptacle for conserving heat.

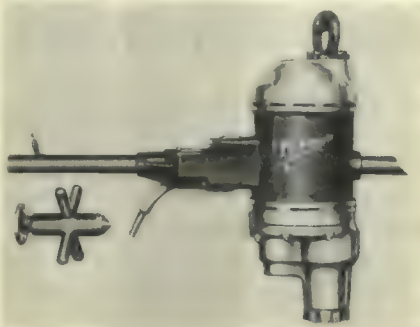


Portable electric gluepot

The heating element is sealed tightly with asbestos to eliminate fire hazards, short circuits, etc. The sides of the pot are sloped to minimize spillage, and a heavy iron wiper across the center of the glue container prevents waste from drippage.

Universal Drill

SEVERAL improvements appear in a universal drill of 1½-in. capacity announced by the Hisey-Wolf Machine Company, Cincinnati, Ohio. The motor is mounted in ball bearings which in turn are fitted to eliminate the slip and creeping action so detrimental to the motor and other mechanical parts. The gear on the armature shaft is removable. All gears are proportioned for maximum strength and smooth running. They are made of high-grade steel, electrically heat-treated. The compound gear shaft has a bearing at each end.



Universal drill of 1½-in. capacity

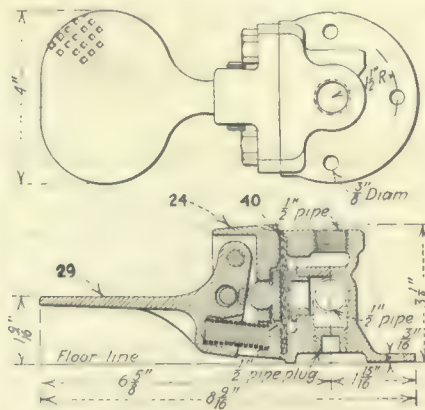
The drill spindle is fitted with a No. 3 Morse taper socket. It is of liberal dimensions, hardened and ground, and is automatically lubricated through the gear case. Brush-holders are provided with adjustable spring tension and the end handle cover is a rugged casting independent of the motor and motor bearings. This relieves them of strain and affords a convenient means of access to the carbon brushes for adjustment or renewal.

"A bird in the hand is worth two in the bush." So a car on the road is worth two in the shop.

Independent Devices for Foot and Cut-Off Valves

FORMERLY a device furnished with safety control equipment by the Safety Car Devices Company included the combined foot and cut-off valve with the twofold function of preventing automatic application of the brake when a straight air brake application of predetermined amount was made and when the operator found it necessary to release the controller handle to relieve fatigue, make change, issue transfers, etc. Two independent devices of improved form are now announced by the Safety Car Devices Company, Wilmerding, Pa., to take care of these functions. These include a diaphragm type foot valve and a diaphragm type cut-off valve.

By making these devices in separate units instead of combined the equipment is simplified somewhat since only one cut-off valve is required for either single or double end equipment. The diaphragm type of construction makes the valves practically leak proof. In the foot valve illustrated



Association Activities

One-Man Cars in Europe*

Trials of one-man buses and cars are being made under stress of higher costs. One-man operation in Paris has been satisfactory and will be extended

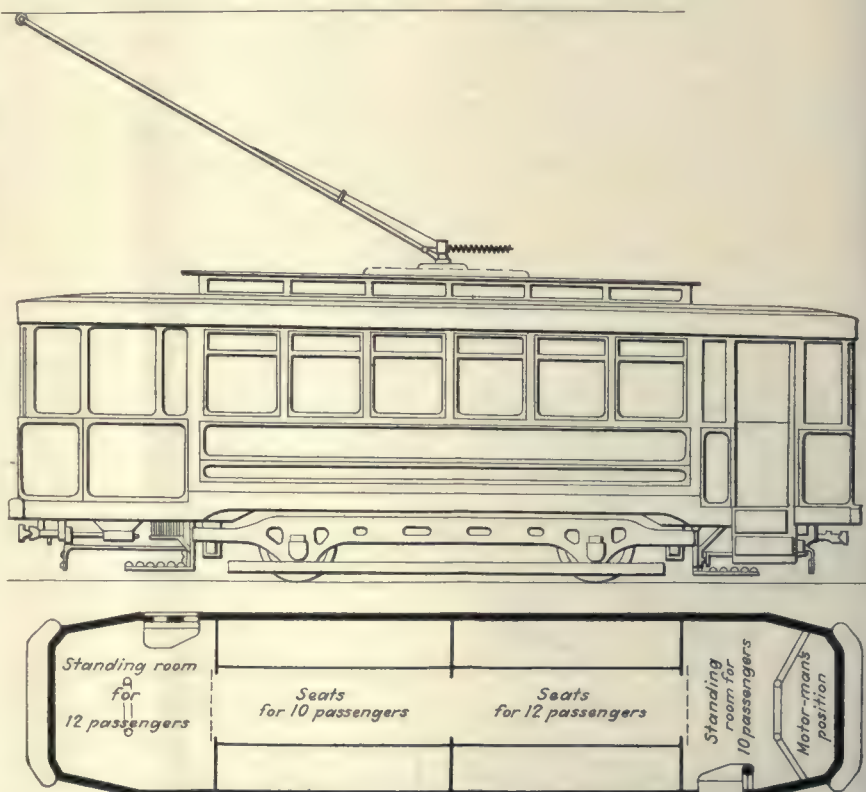
By J. CHAMPETIER DE RIBES

Transportation Manager of the S.T.C.R.P. (Paris Surface Railway and Bus Lines)

SINCE the war, the expense for platform labor has become an increasing proportion of operating expenses of electric railway and bus companies throughout the world. In Paris, during 1926, platform labor represented 29 per cent of the entire operating cost. Efforts to decrease it have been in various directions, such as (1) increase of schedule speed of cars and buses, (2) increase in size of vehicles, (3) operation of cars in trains, and (4) decrease of the platform labor cost by one-man operation, either by (a) the collection of fares before the passenger enters the car, or (b) by combining the duties of motorman and conductor. Of these methods, the first is becoming increasingly difficult owing to growing street congestion, and the second and third mean more stops per unit and therefore lower speed. Moreover, city regulations place a limit on the length of trains. The first alternative under (4) is used to some extent in Paris but is hardly practicable on city streets as ordinarily it means the use of prepayment areas. Hence the possibilities in reduction of labor costs lie largely in extending the one-man principle.

The idea is not new. It was used many years ago on a small scale with horse cars in America and also in Paris. As late as 1913 a Paris horse car line was run on this principle. The great development in one-man operation has occurred, of course, in the United States, beginning with the Birney safety car, but there have been trials of the system in Europe also. Thus, the Berlin surface lines introduced one-man cars on a small scale in 1923 on a line with light traffic. When the number of passengers increased, two-man operation was substituted.

The London United Tramways put in operation in 1922 a single-deck, single-truck car, like the Birney, with satisfactory results. Later, four double-truck cars, weighing 12 tons each, with interlocked pneumatic door control and other safety features followed. The Rooke register was used to collect fares and a change-making machine was installed. The seating capacity was 30 passengers and a schedule speed of 10



Type of one man car used by the Paris surface lines

m.p.h. was attained. The motorman was paid a somewhat higher wage because of the added duties performed. These cars did not meet popular approval, but this may have been because they were single-deck and the British riding public favors double-decks.

The Basle (Switzerland) Tramways put a one-man car in operation in 1927 as a trial. It was similar to the Birney in design and had full safety equipment. The results are not available.

The Malmö (Sweden) Tramways has one city and three suburban lines with one-man operation and despite the payment of a higher wage to the motormen, platform expenses were reduced 46 per cent. The schedule speed is 9.3 m.p.h., instead of 9.7 with two-man cars. The zone system of fares is used, the passengers paying on entering. The results have been satisfactory.

The Arnhem (Holland) Tramways put some single-truck one-man cars in operation in 1923. Each had accommodations for 18 seated passengers and

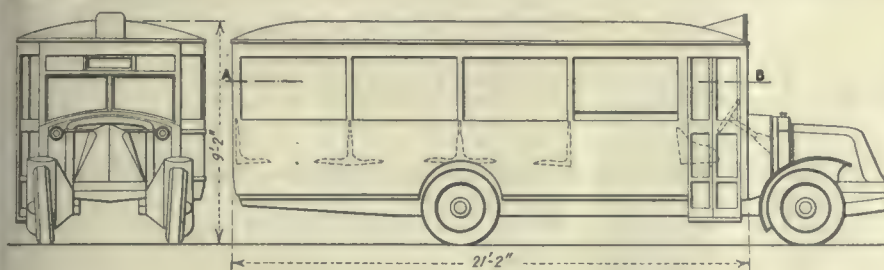
14 standing passengers. The results have been so good that all cars on the system have been changed over for one-man, including cars with a capacity for 24 seated and 25 standing passengers. The headway has been reduced. The recent adoption of the unlimited-ride weekly pass has undoubtedly helped the problem of fare collection.

The S.T.C.R.P. has been operating for some time a one-man car of the type shown in an accompanying illustration and has recently expanded this service to fifteen cars. Only one class of passenger service is given on these cars, instead of two, the usual practice in Paris. Automatic sanding and braking are used and the doors are controlled by the operator in the usual American manner, except that they are arranged so that they can be opened from the inside by the passengers.

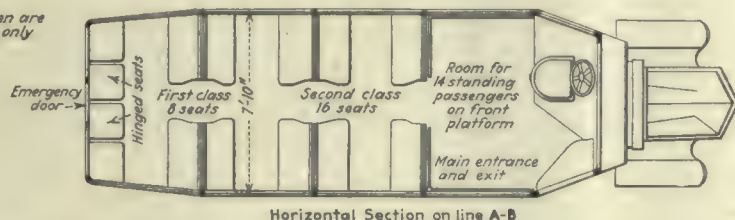
ONE-MAN CARS AND BUSES IN PARIS

In 1924 the S.T.C.R.P. put 50 one-man buses in operation. They were designed primarily for express service between the center of the city and the outskirts, and each had a capacity of 25 seated passengers, but carried only one class. They were equipped for a speed of from 20 to 25 m.p.h. Entrance and exit were at the front only. Later, several 38-passenger one-man buses were built, also with entrance and exit

*Abstract of paper presented at the convention of L'Union des Voies et des Transports Automobiles (Railway and Bus Association of France), held in Marseilles, Nov. 6-8, 1927.



Dimensions given are approximate only



This one-man bus used in Paris accommodates 38 passengers

in front, but designed to carry two classes of passengers. The body has a length of 21 ft. 2 in. and wheelbase of 14 ft. 5 in. A line drawing is given of these buses, showing other dimensions.

There are more exact data available on the one-man bus service than on the Paris one-man trolley service.

The 50 express buses mentioned ran on five different routes, were in service only during the rush hours and made only two or three stops between terminals. The fares were somewhat higher than first-class fares on the regular buses, and no standing passengers were carried. The financial results were not satisfactory and the service was abandoned in 1925.

The objections were five in number, as follows:

(1) Running only during the rush hours, the buses were largely empty during alternate half trips. (2) The higher fare adopted because of the expensive operating conditions appeared prohibitive to many persons who otherwise would have patronized them. (3) To increase the schedule speed, each line had an average of only two loading stops, but although these stops were chosen with regard to their desirability from a traffic standpoint, it was found hardly possible to obtain sufficient passengers going from these points to fill the bus seats. (4) Because of this small patronage, the buses were run on a pretty long headway, which made the lapse of time for many passengers about the same as if they used the regular service. (5) The street congestion was such that the express buses were able to make a schedule speed of only 22 m.p.h. This was a gain of only about 40 per cent over the speed of the regular buses, which was 15.6 m.p.h.

After this express service was abandoned, the buses were transferred to lines in the suburbs, but one-man service was continued and under conditions which permitted careful study. For instance, one line was divided into three fare sections and had twelve stops, of which three were obligatory. The distances between stops varied between 800 ft. and 4,000 ft. Fare was paid as the passenger entered, but owing to the

rather complicated schedule of fares the operator had to have tickets at eight different prices. Nevertheless the one-man buses made better over-all time over the route than two-man buses.

In expenses, maintenance for the one-man buses was higher, largely because they were equipped with pneumatic instead of solid tires. The total operating expenses, however, were 12 per cent less for the one-man buses, or 25.34 cents, instead of 28.67 cents, per bus-mile. Actually, these figures are not quite comparable because the two-man bus has places for 38 seated and standing passengers, whereas the one-man bus has places for only 30 passengers, of which 25 could be seated.

ONE-MAN VEHICLE THE TYPE OF THE FUTURE

The conclusions reached by the company are that the one-man vehicle is the vehicle of the future, though certain conditions must prevail. They may be summarized as follows:

(1) The system of fare collection should be so simple that fares can be paid easily and rapidly. Where a flat fare cannot be charged the rate should be such that fares can be paid with coins in common use. (2) The vehicles, whether buses or cars, ought to have ample carrying capacity. The Americans seem to be abandoning the small Birney 32-seat safety car for cars hold-

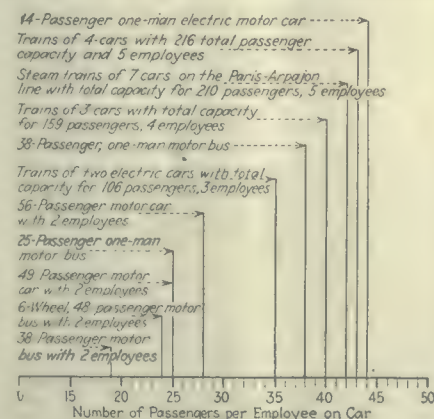


Chart showing the number of passengers per operator on various Paris vehicles

COMING MEETINGS OF

Electric Railway and Allied Associations

May 2-5—Southwestern Public Service Association, Dallas, Texas.

May 4—Metropolitan Section, A.E.R.A., 33 W. 39th Street, New York, N. Y.

May 6-12—Union Internationale de Tramways, de Chemins de fer d'Interet Local et de Transports Publics Automobiles, Rome, Italy.

May 7-10—National Conference on City Planning, Dallas and Fort Worth, Texas.

May 8-11—United States Chamber of Commerce, Washington, D. C.

May 9—A.E.R.A. Executive Committee, Washington, D. C., 3 p.m.

May 9-10—Central Electric Railway Master Mechanics' Association, Lawrence Hotel, Erie, Pa.

May 9-12—American Institute of Electrical Engineers, regional meeting, Northeastern District, Hotel Taft, New Haven, Conn.

May 24—New England Street Railway Club, annual meeting, Boston, Mass.

June 4-6—Midwest Electric Railway Association, Hotel Baltimore, Kansas City, Mo.

June 4-8—National Electric Light Association, Atlantic City, N. J.

June 6-8—Canadian Electric Railway Association, annual convention and exhibit, Toronto, Canada.

June 14-15—New York Electric Railway Association, Half Moon Hotel, Coney Island, N. Y.

June 20-27—American Railway Association, Div. 5—Mechanical, annual convention and exhibit, Atlantic City, N. J.

June 21-22—American Railway Association, Motor Transport Division, Atlantic City, N. J.

June 21-22—Wisconsin Utilities Association, Accounting Section, Hotel Pfister, Milwaukee, Wis.

June 28-29—Central Electric Railway Association, Cedar Point, Ohio.

July 8-12—Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.

July 25-27—Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.

July 27-28—Central Electric Railway Accountants' Association, Detroit, Mich.

Aug. 16-17—Wisconsin Utilities Association, Transportation Section, Sheboygan, Wis.

SEPT. 22-28, 1928

American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

ing as many as 68 seated passengers. The trials being made in Paris with one-man cars of 44-passenger capacity should give good results. As for buses, the 38-passenger bus which has been mentioned should give better results than the 30-passenger bus.

No steps should be neglected in the education of the public to the use of these vehicles before they are actually put in service.

Equal care should be given to insuring the interest of the employee in making the experiment successful. The operator of a one-man car may properly receive a somewhat higher wage than the member of a two-man car crew.

Hotel Arrangements at Cedar Point

SPECIAL hotel rates have been granted for the summer convention of the Central Electric Railway Association, to be held at Cedar Point, Ohio, on June 28-29. At the Hotel Breakers

the majority of the rooms will be available at \$2 a day for one person or \$1.25 each for two persons. There also are numerous rooms at the rate of \$2.50 for one person or \$1.75 each for two persons, and a limited number at higher prices. Rooms with bath are \$4 and \$4.50 for one person and \$2.75 and \$3.25 each for two.

At the Hotel Cedars most of the rooms are \$2 for one person or \$1.25 each for two, with a limited number \$3 for one and \$1.75 each for two persons. Rooms with bath are \$3.50 for one person and \$2.25 each for two persons.

At the Bon Air Annex all rooms are with bath and twin beds. A number are at \$5 for one person or \$3.50 each for two, while the majority are \$6 for one person and \$4.50 each for two persons.

All railroads grant tourist rates to Cedar Point which are considerably cheaper than the regular rates. Information regarding trains, fares and Pullman accommodations can be obtained at railroad ticket offices.

American Association News

Subjects and Meetings

DEFINITE plans for the Cleveland convention were blocked out at the meeting of the committee on meetings and subjects of the American Association held at association headquarters, New York City, on April 20. Chairman Frank R. Coates stated that he had presented the tentative program of the convention previously adopted to the executive committee and that it was approved with certain suggestions.

The general subject for the first day will be "Economics." This will include economics of public transportation and its future in cities, as well as developments going on in the transportation field. Tuesday will be left for inspection of exhibits, instead of Wednesday as in previous years. Tuesday evening, however, will be Advisory Council Night as heretofore. The subject for Wednesday's meeting will be "Modernization." On Thursday the subject will be "Viewpoint of Others on Our Industry." This is planned to include a series of addresses by men from outside the industry.

It is proposed to continue the round-table luncheon in a form similar to that used last year. It is now planned to have a total of fourteen of these groups with topics as follows: Monday—safety, fares, taxation, manufactures; Tuesday—interurbans, traffic, education, merchandising; Wednesday—financing, public relations, new cars; Thursday—freight, management, motor bus. It is planned to limit each luncheon to 50 people and if the demand is made for more seats, it will be determined later whether arrangements should be made for an additional group. These lunch-

cons will be held at the various hotels and tickets will be sold in advance on application, similar to the method used last year.

Those present at the meeting were F. R. Coates, chairman; J. P. Barnes, H. V. Bozell, I. C. Bradley, C. A. Brooks, H. C. Clark, G. H. Clifford, W. A. Draper, Charles Gordon, T. R. Langan representing M. B. Lambert, and W. T. Rossell, of the committee, and R. P. Stevens, president of the association; L. S. Storrs, managing director; Labert St. Clair, J. A. Miller, Jr., Leslie Vickers and J. W. Welsh, general secretary.

Traffic and Safety

SELLECTION methods and the training of men were important subjects discussed at the meeting of the traffic and safety committee of the Transportation & Traffic Association, held at association headquarters on April 13. After the original assignments were reviewed by Chairman R. W. Emerson, the individual subcommittee chairmen reported on the development of their respective topics which had been assigned at a previous meeting.

Dr. C. F. Slocombe outlined his section of the report entitled "Make a Study of Men and the Causes of their Failure in Accidents." The Milwaukee psychological tests were discussed in considerable detail since one member of the committee, John A. Dewhurst, had made a special study of this particular topic. The consensus of opinion among the committee members was that more up-to-date information should be obtained. To this end the chairman will shortly appoint a committee to make a

more detailed study of the recent results at Milwaukee.

"Accident Classification" was reported upon by Mr. Emerson who is working in conjunction with E. J. Murphy, statistician of the association. Mr. Emerson also reported on item No. 3, "Co-operate with the Committee of the American Engineering Standards Committee on the Study of Colors for Traffic Signals." S. E. Emmons, chairman of the subcommittee to study the question of improved schedule speeds as affected by fare collection, loading delays and traffic control systems, read an excellent report on the subject.

The committee was inclined to believe that with the subjects assigned the field was too wide to be covered by one committee's activities and that the final report would not be a thorough treatise on any one. Following a suggestion of Guy C. Hecker, the committee spent some time in discussing the advisability of concentrating on only one or two subjects for this year's report, leaving the balance of the work to be completed next year. The committee will decide this question finally at its meeting, which is planned for the first week of June. Boston has been selected upon the invitation of Edward Dana, president of the Transportation & Traffic Association.

Those present were R. W. Emerson, chairman; H. O. Allison, M. W. Cooke, S. E. Emmons, E. K. Miles, C. F. Slocombe, C. D. Smith, E. C. Spring, J. A. Dewhurst, Guy C. Hecker, and John A. Miller, Jr.

Motor Buses

REVIEW of the uniform motor bus specification code sponsored by the Society of Automotive Engineers and the National Automobile Chamber of Commerce was the principal business before special rolling stock committee No. 2—motor buses, at a meeting held at association headquarters in New York on April 16.

A number of suggestions were made relative to the code. With these suggestions, it was voted to recommend indorsement of the specifications for action by the standing committee on rolling stock.

The work of reviewing the uniform specifications code occupied the entire day. With regard to the other subjects assigned to the committee, Chairman Berry reported that it probably would not be possible to cover all of them this year, but that he and several of the other members have been working on some of these subjects and would in the near future be ready to submit material for comments and criticisms of the committee members.

The following members were present: V. W. Berry, chairman; H. C. Eddy, F. A. Klock, A. J. Scaife, H. D. Schultz, W. A. Blume, G. W. Wilson, E. H. Lamberger representing S. B. Cooper, A. Klein representing L. H. Palmer, and C. W. Stocks.

News of the Industry

Key System Exonerated in Ferry Accident

United States steamboat inspectors have exonerated engineers of the Key System Transit Company, Oakland, Cal., of blame for the accident of Feb. 17 when the Key ferry boat *Peralta*, crowded with passengers on her way to Oakland from San Francisco, Cal., did a sudden nose dive and precipitated more than a score of persons into the bay. Five were drowned. The men exonerated are Edward Dyson, chief engineer of the *Peralta*, and Harry E. Hill, his first assistant. In announcing their decision the steamboat inspectors said that there was insufficient evidence to corroborate charges of inattention to duty and negligence which had been placed against the two men. It was found that some of the *Peralta's* passengers jumped, some were crowded and some were actually washed overboard. Causes assigned for the accident were a combination of swell from the passing Key Route ferryboat *Hayward*, the incoming tide, shallow water and the fact that the *Peralta* was down in the head.

Discontinuance of use of the ballast tanks on the *Peralta* and her sister ship, the *Yerba Buena*, is ordered and chains are to be installed on the two crafts to keep passengers far back from the bow. Both boats must proceed slowly over the shallow area in San Francisco Bay where the accident occurred, and only one day's supply of oil and water are to be carried on the boats to make them ride higher in the water.

Out to Win Coffin Award in Gary

An effort to win the Charles A. Coffin award is to be made by the Gary Railways, Gary, Ind. An announcement to this effect was made recently by president Charles W. Chase, who referred to the honorable record of the company and the splendid results of the recent rehabilitation program. All employees were solicited to get back of the movement and to help win the honor.

Ten-Cent Fare Sought in Savannah

A straight 10-cent fare for casual riders, a 5-cent fare for school children and tickets sold at the rate of six for 50 cents are being sought by the Savannah Electric & Power Company, Savannah, Ga. Savannah now has a 7-cent fare and tickets are sold at the rate of fifteen for \$1 to regular commuters.

The petition of the company for an increase in fares was presented to the Georgia Public Service Commission on

April 18 by Howard C. Foss, president of the company. The petition declares that the present schedule of fare rates forces the Savannah company to sustain an annual loss in its passenger department. It also states that the growing use of private automobiles has adversely affected the railway earnings.

Hearing was set for May 15 before the Public Service Commission. At that time arguments for and against the proposed increase in fare will be heard and a decision rendered.

Passes in Utah

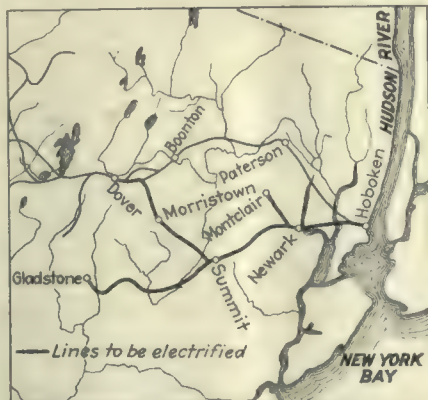
The Utah-Idaho Central Railroad has installed the weekly pass system on all of its lines operating in Ogden, Utah, except the line known as the Ogden-Huntsville line. The latter is not included, due to the long distance between points. Passes will be good for seven days and are transferable.

Ten Cents in San Jose

Experimental fares, calculated to produce sufficient revenue to net a 5 per cent return upon the property of San Jose railroads were authorized by the California Railroad Commission. The recent decision increased single local fares from 6 cents to 10 cents, with four tokens or rides for 25 cents. The same rates were also authorized for the Peninsular Railway on its San Jose local lines. These two railways applied to the commission for increased fares on the San Jose local lines, setting forth that present rates were entirely inadequate. The commission authorized the new fares as an experiment only, in the hope that the earnings of these companies would be improved to the extent that adequate service might be maintained. The new fares will be applicable on the local lines of the two companies in the City of San Jose, interurban fares not being involved in the proceeding.

Electricity for Another New York Road

Delaware, Lackawanna & Western to spend \$18,000,000 on equipping suburban lines. Construction to start as soon as engineers report



District in which electrified lines will operate

will be used. If it is necessary to purchase power from outside producers the cost will be \$14,000,000, while if the railroad decides to construct its own generating plant and manufacture its own power the cost is estimated at \$18,000,000.

This action of the managers follows the presentation of a petition of a joint committee, representing business and civic organizations of various communities in a section of northern New Jersey with a population of approximately 1,250,000 asking that the lines be electrified. The petitioners expressed their willingness to agree to an increase in commutation fares in order to secure the improved facilities.

President Davis in his statement said:

BETWEEN \$14,000,000 and \$18,000,000 is to be spent by the Delaware, Lackawanna & Western Railroad in the electrification of the Morris & Essex line from Hoboken to Dover, the Passaic & Delaware to Gladstone and the Montclair branch, a total of 78 miles of road, or 173 miles of track, James M. Davis, president of the road, announced on April 23.

Construction work will be started just as soon as Lackawanna engineers can prepare plans and it is expected that electrification will be completed within two years. Direct current probably

This matter of the electrification of the suburban lines of the Lackawanna has been the subject of much speculation and discussion on the part of our patrons and communities for a long time; it also has been accorded consideration by our board, but the present service is thoroughly dependable, operates with clock-like precision and the cost mounted so high that, considering the gradual loss of traffic to other forms of transportation that come and go, the increased cost of performing service and the everlasting pressure to reduce rates here and there placed us in a position where we were unable to imagine an increase in traffic or a reduction in expenses of sufficient proportions to enable the railroad to get its money back. Obviously,

therefore, we have been rather cautious about incurring such a burdensome obligation.

The committee expressed the opinion that the importance of this project was so outstanding to their communities that those whom they represented would be willing to pay increased commutation fares in order to secure the advantages of such improvement in transportation facilities, and placed themselves on record agreeing to co-operate with the railroad in securing an increase in commutation fares. Under such circumstances our board has authorized the project.

Some conception of the far-reaching significance of the change and what is involved can be gained when one contemplates that while the construction of many of the present suburban cars is such that they can be altered to fit the new operating conditions, about 100 of these cars which are now in good condition and serviceable for a long time to come will have to be replaced with others of special design; that about 75 perfectly good locomotives which are now in splendid condition but shall have to be replaced, are not readily salable and in all probability, will be reduced to mere scrap value; also that engine houses, coal-handling plants, water stations, ash pits and other railroad paraphernalia almost without end, incident to steam operation, shall have to be dismantled.

The railroad owns both land and water rights along the Hackensack River and has ample quantities of excellent steam coal readily available to its lines. Officials of the company are carefully weighing the advantages and relative cost of purchasing electric power from outside companies as compared with the construction of a generating plant and manufacturing its own power. The construction and equipment of a power plant of capacity sufficient to meet the railroad's needs will cost about \$4,250,000.

The work of construction will be handled by an electrical committee of the Lackawanna, appointed by President Davis, consisting of Vice-President and General Manager E. M. Rine, chairman; Chief Engineer G. L. Ray; Electrical Engineer H. M. Warren; General Superintendent E. B. Moffatt; Superintendent of Motive Power and Equipment C. J. Scudder, and Superintendent R. M. White, with the advice and assistance of Jackson & Moreland, well-known consulting engineers.

Construction work will be started just as soon as the Lackawanna engineers can prepare plans, and it is estimated that it will be completed within two years.

Pass Tickets for St. Louis Employees

The St. Louis Public Service Company, St. Louis, Mo., has recalled all of the old employees' badges issued by the United Railways and is now issuing to each employee a pass ticket good for 104 rides. Tickets must be presented to the conductor for punching, and when used in full additional tickets may be obtained from the various department heads. Trainmen, when using the tickets, must also present their badges.

To Make "Safe Workers"

The *Safe Worker* will be published each month, beginning in May, by the National Safety Council for distribution to employees. Stories, jokes, helpful hints, poems, a calendar and a space for a record of time will appear in every issue. The purpose is to keep safety alive in every plant year in and year out. The schedule of prices per month is as follows:

Copies	Each in cents
25 to 100.....	4
101 to 500.....	3½
501 to 1,000.....	3
1,001 to 3,000.....	2½
3,001 and over.....	2¼

For instance, delivery on the June issue cannot be made unless the order is received before May 20. There are no transportation charges up to 1,000 copies—larger quantities f.o.b. Chicago.

Bill to Curtail Powers of I.C.C. Over Railway Extensions

Advocating that the Interstate Commerce Commission be divested of the power to require a "certificate of public convenience and necessity" from railroads and electric railways desiring to make extensions, Representative Abernethy, Democrat of North Carolina, has asked Congress to amend the interstate commerce act. The measure is similar to one introduced in the Senate in December by Senator Simmons.

The presentation of the measure is an outgrowth of the recent refusal by the I.C.C. to grant permission to the Piedmont & Northern, an electric line, operating in the Carolinas, to extend its lines, after a hotly contested argument in which the Piedmont & Northern maintained that the I.C.C. did not have jurisdiction.

Representative Abernethy pointed out to the House that state officials, including the Governors and the railroad commissions of the two Carolinas; civic organizations and shippers had asked the I.C.C. to approve the application, while the only opposition came from competing railroads.

In referring to the I.C.C. decision, he said:

Such power as has been exercised by six men who rendered the decision could not have been contemplated by the most ardent supporters of the interstate commerce act. No one could have dreamed that the men chosen by the President of the United States and confirmed by the Senate to carry out the mandate of Congress would ever have exercised such power as is evidenced by the decision in this case.

He declared that the Piedmont & Northern had never been treated by the I.C.C. as a railroad subject to the valuation act; that it is governed by the accounting rules laid down for electric railways; that on Oct. 12, 1920, the I.C.C. ruled that the Piedmont & Northern was not subject to the transportation act of 1920, relating to the issuance of securities, and that the Railroad Labor Board had ruled the Piedmont & North-

ern was an electric interurban line not operated as a part of a railroad system. He declared:

To put this matter in plain and simple language, we find a commission here in Washington which by vote of half of its membership denied to two sovereign states the right to have constructed strictly within the borders of their states an extension of an electric railway.

Increased Rates in Joplin

A ruling of the Missouri Public Service Commission delivered April 20 grants increased rates to the Southwest Missouri Railroad in the city of Joplin. The increase is from the present fare of 5 cents for adults to 8 cents for a single adult fare, with two token fares for 15 cents. Under the ruling the company is entitled to charge the increased fare for a trial period of thirteen months.

Testimony taken in the hearings showed during the period from Sept. 15, 1926, to Aug. 31, 1927, that the company had suffered an operating loss on its Joplin lines of more than \$20,000.

Rehearing Sought by City on Pacific Electric Rate

The city of Los Angeles, Cal., through Jess E. Stephens, city attorney, has petitioned for a rehearing of the California Railroad Commission's recent order fixing rates for the Pacific Electric Railway in Los Angeles and points in southern California. It is alleged that the rates fixed by the commission are discriminatory and unfair as between the patrons of interurban lines and those of the local system, for the reason that interurban fares have been reduced and increases on the local system have been granted, notwithstanding the rate of return upon the capital investment on the local system has been comparable with the same on the interurban lines.

Seventy-Cent Top Rate in Pittsburgh

A settlement of the trainmen's wage scale agreement between the Pittsburgh Railways, Pittsburgh, Pa., and the Amalgamated Association has been reached. In consequence it has been announced that, effective May 1, trainmen will receive an increase of 1½ cents an hour. This brings the maximum rate to 70 cents. On Jan. 1, 1927, an agreement was reached whereby the wage rate of trainmen was increased 1½ cents.

Trainmen have been on a maximum rate of 68½ cents an hour with a starting rate of 61½ cents. Effective May 1 for a period of two years, the time of the contract, the starting rate will be 63 cents. After the first three months the hourly rate rises and the maximum rate is reached at the end of the first year.

Rapid Transit Before St. Louis Board

Rapid transit was brought before the St. Louis, Mo., Board of Aldermen as a paramount issue at the first meeting of the 1928-29 session of the board on April 17, when Mayor Miller and Aldermen Sam Wimer both presented bills calling for the creation of a rapid transit commission. Mayor Miller's bill differs in several material points from the measure filed at the last session of the Aldermen. The chief point of difference is that the new bill provides the city shall appropriate \$50,000 for use of the commission in making a transit survey, while the old measure provided among other things that the St. Louis Public Service Company should reimburse the city to the amount of \$100,000 to be used in the survey.

Furthermore the new bill gives the railway only one non-voting member on the commission while the other bill provided the company should have three voting members. The new commission would have sixteen members, including representatives of the City Plan Commission and the State Public Service Commission and not more than seven private citizens. All members would serve without pay and the life of the commission would be two years. The commission would study all phases of transportation, general street and highway plans and related matters.

Mr. Wimer's measure provides for only \$6,000 for clerical and incidental expenses of the commission he would create. His commission would include the Rapid Transit Committee of the aldermanic board and six citizens to be named by the Mayor.

Unanimous approval for a rapid transit system was expressed by leading business men at a recent public hearing.

Tax Relief Sought by Danville Company

The Danville Traction & Power Company, Danville, Va., is seeking an amendment to its local franchise and relief from the tax required for the use of the city streets. At present the company pays the city 1 per cent of all gross receipts up to \$40,000 and one-half of 1 per cent thereafter. Waning public patronage and the heavy blow dealt the Danville company on account of curtailment of the Danville textile mills are advanced as reasons for tax relief.

Mayor Wants Fifteen-Year Boston Extension

Mayor Nichols of Boston, Mass., appeared before the House Ways and Means Committee at the State House recently and explained his bill for the continued public control of the Boston Elevated Railway. The bill provides for a fifteen-year extension of public control, the creation of a board of five public trustees, of whom three shall be appointed by the Governor of Massa-

chusetts and two by the Mayor of Boston. The Mayor said he did not care to control the board, but felt it was a big program and the city had considerable interest in it.

Mayor Nichols explained that he had not included in the bill any provision for the purchase of the common stock of the company because, he said, he did not want to load it down with too many controversial matters. While it was Commissioner Eastman's idea that the state could buy the common stock, little by little, the Mayor felt the state was not quite ready for such action.

It is provided in the Mayor's bill

"U" Turns Prohibited in Chicago Loop

Passage on March 29 by the City Council of a new ordinance prohibiting mid-block or "U" turns in the Loop district, in the opinion of traffic officials of the Chicago police department, will give Chicago the most efficient and fastest movement of heavy street traffic in any city in the country. The new ordinance must be signed by the Mayor before it can become effective. It was bitterly opposed at the public hearing stage, by taxicab companies regarded as the gravest offenders.

Let Us Be Fair!

A FEW days ago the California State Railroad Commission granted a permit to a bus line to operate in direct competition with one of the beach lines of the Pacific Electric Railway. Without regard to the merit of this particular proposition, it should be said that the general policy enunciated in such permits amounts to subsidizing competitors of railways and that in principle it is unfair and inequitable.

The railroads are California's heaviest taxpayers. . . . On the other hand, the bus lines pay almost no taxes at all. . . . California owes a tremendous part of its development to the railroads; without them much of its area would still be ranches and desert, sparsely settled and almost unproductive. . . .

Even this does not tell the whole story. If the railroads had been treated like ordinary private businesses in the past, allowed free sway in setting their own prices for the services they render, they would have no ground for complaint if another agency succeeded in obtaining the business. But they were not given a free hand; their fares have been regulated, their earnings restricted even while their taxes rose; they have not been allowed to accumulate a fund which

might now be used in protecting themselves in a competitive rate war. This is no argument against public regulation; it is an argument showing that if the state does regulate, it is in duty bound to protect. It has limited railroad earnings on the ground that railroads are a natural monopoly; the plain corollary is that this recognized monopoly should not be interfered with artificially and without compensating grants.

The *Times* holds no special brief for the railroads. It has had several hard battles with them in the past, outstanding examples being the fight for a free harbor at San Pedro and the fight for a union station at the Plaza, in both of which most of the other newspapers of the city took the railroads' side. It has consistently opposed the railroads when it believed them wrong, and just as consistently it has been for them when it believed them right.

It believes now that this whole matter of bus competition with the rail carriers needs to be taken up and settled according to the plain principles of equity and justice, and that the railroads should be given just as fair treatment as the public they serve.—Los Angeles *Times*.

that all the subway leases, the old ones as well as the new ones, should be made to expire in 1953. The old ones are dated to expire in 1936. But the Mayor would not agree to the suggestion that the subways should be operated free of rentals after the bonds had been paid. He said the rental money after that date could be applied to extension and improvement of service.

The new bill also provides that if the stockholders of the Boston Elevated do not accept this measure the secretary of the commonwealth shall give notice to terminate public management and operation of the property. The Mayor said the time had come when this matter should be settled, and now was a good time to end the controversy.

Decision Against Non-Paying Extension in Cincinnati

Cincinnati's City Council voted seven to two, on April 18, against extension of the Warsaw Avenue line of the Cincinnati Street Railway to the Westwood car line, in order to serve pupils of the new Western Hills high school. Representatives of the railway said this was only the first of many similar extensions sought by residents of various sections, which, if undertaken, would tend to cripple the company. Parents of high school students in the district, on the other hand, said that without an extension their children would have no means of transportation to the school. Establishment of a bus line now is contemplated.

Free Window Display for Market Street Railway

Car card and newspaper messages have long been accepted as good mediums for electric railway advertising but out in San Francisco, Cal., window display as a medium goes even further. It pays for itself. As a result of a display at Christmas time by the Market Street Railway several locations are now open to the company to exhibit under similar arrangements with rental free.

In December, 1927, the Market Street Railway had an attractive exhibit in readiness and no place to show it. Several realtors and building managers had stores for rent in good locations so the railway sold an enterprising real estate firm on the idea that a decorative window would win a prospective tenant more readily than an empty window in an unlighted store. Removal on notice was satisfactory to both parties.

In accordance with the plan at the Holbrook Building, 58 Sutter Street, the week before Christmas the display, neat and attractive, was opened and the company was permitted to install large flood lights, paying for the current but no rent. There were Christmas trees, red crepe paper, tinsel and the like, model of a new car and samples of some of the 750 street car parts made by the company ranging from trolley wheels to door handles all in the natural brass. Practically every part of the city and many important events of recent date were represented in pictures. People paused for as long as half an hour in an effort to identify the different scenes portrayed.

The same general idea was carried out in a later display except that the trimmings were in deep blue. When the next move is made nine smaller models portraying the development of railway transportation in San Francisco will be added. These will include an early type of horse car, known as a balloon car because of its circular body, a steam tram, the first cable car in the world and thus down to the California Comfort Car of 1925. The exhibit appears to be destined to travel through all parts of the city in choice locations.

Higher Fares on Hydro-Electric Lines

A new schedule of increased fares became effective on the lines of the Hydro-Electric Railways in Windsor, Canada, on April 15. The new schedule calls for four tickets for 25 cents, or a straight 7-cent fare instead of a straight 6-cent fare, or twenty tickets for \$1. The joint transportation board, representing the several communities affected, has stipulated that the old schedule must be resumed on Oct. 31. This board, at the instance of Alderman Clyde Curry, demanded nine tickets for 50 cents.

The Hydro-Electric Power Commission, which operates the railway, has reported a \$75,000 deficit, but the Mayors and Aldermen of the various municipali-

ties claim that the increased fare should make this up by the end of October. According to newspaper comment the persistent criticism of the service in the past year, coupled with the new rate, has resulted in a demand for local control of the border lines, instead of control from Toronto.

Indiana Papers Boom Interurban

The two newspapers at Boonville, Ind., have been running a series of articles urging the people of that section to be more liberal in their patronage of the Evansville, Suburban & Newburgh Railway, which operates from Evansville to Boonville and Newburgh, Ind. They urge the business men to ship freight by the railway instead of the trucking lines that operate along the state highway between Evansville and Boonville. The Boonville Business Men's Association has repeatedly urged the merchants to patronize the railway, pointing out that the trucking companies pay no taxes in Warrick County.

The Clangor of Jacksonville's Varicolored Car

PROBABLY some time today you'll meet *it*. *It* may be placidly waiting for the "go" signal at Bay and Main Streets, or *it* may be ambling squat and heavy and contentedly on St. Johns Avenue. Sooner or later you'll cross *its* trail. *It's* a street car.

Yes, sir! A street car. But *such* a street car. Never before in Jacksonville's history and, in all probability, never before in the history of any Southern city has such a car raised its clangor.

Red and white and blue and gray and brown and green—the colors of the spectrum were overtaxed in the phantasmagoria of shadings decreed by the Jacksonville Traction Company for its vehicles henceforth.

For several days *it* has stood in the carhouse of the company, a gayly colored thing awaiting the drop of the barrier to race forth upon the streets. Unlike the company's new Murray Hill buses, *it* has no name.

It is an experimental paint job. If Jaxons see *it* and are not stricken suddenly blind the company will give it a brother in brilliance and a sister, and a papa, and a mama, and a whole flock of bedaubed uncles and aunts.

Lest Jaxons suffer* from the monotony of street car colors in the future, and the company officials, directed by a sudden welling up of futuristic impulses, have no desire that they should, all *it's* relatives will wear different garbs in different ways.—*Jacksonville Journal*.

Conferences on Wages in St. Louis

A deadlock has been reached in the negotiations between officials of the St. Louis Public Service Company, St. Louis, Mo., and its 4,500 employees relative to a new wage scale and working agreement for members of the Amalgamated employed by the company.

Recent developments are the rejection by the workers of the company's counter-proposal that the carmen, maintenance workers and shops crafts accept an average reduction of 10 per cent in wages, and a recommendation to be made to the board of directors of the company that notice of termination of the existing contract be served on the union. The later action was decided upon April 24, following a conference between company officials and a committee from the union at which the decision of the workers in rejecting the company's proposal was reported to the company. The contract proposed to the union by the company was identical with the existing contract except that it called for a decrease in wages to the scale in effect before the increase in 1923. Thirty days notice for terminating the existing contract is required.

Last December after the St. Louis Public Service Company took over the properties of the United Railways the union announced it would seek a new sixteen-months agreement. Subsequently wage increases of 5 cents an hour for the 3,500 platform men and increases up to 10 cents an hour for the 1,000 maintenance men and shop workers were asked. The union has also asked that 65 per cent of all runs be made straight runs to be completed within nine hours. In addition the union wants one-man cars abolished and the period of maximum seniority reached at the end of one year instead of three years.

At present the conductors and motormen receive from 50 to 67 cents an hour, while wages of other workers range from 45 to 81 cents an hour. The increases asked by the union would total about \$450,000 annually.

"Copy" Wins Prize in Augusta

A \$10 gold prize was won recently by D. J. Roberts, a member of the senior class of the Academy of Richmond County, Augusta, Ga., for copy for an advertisement submitted for use in the space of the Augusta-Aiken Railway & Electric Corporation in the *Musketeer*, the school paper. The subject was "Conservation of Their Equipment." The corporation offered the prize to check student marauders who frequently damage cars.

The winning essay called attention to what the railway was doing generally toward progress and prosperity in the south, and particularly for the students, by offering of special rates to them. It urged all to protect the vehicles and to prevent anyone from damaging property of the company.

Recent Bus Developments

Trial Franchise Suggested in Kansas City

A trial franchise to run either four or six months may be the solution to the bus problem of the Kansas City Public Service Company, according to the City Council members.

Despite the fact that the present franchise does not expire till June, a proposal of this kind will probably be made to the Council soon in order that the Council may have ample opportunity to study the proposition made in a recent report by Powell C. Groner, president of the company.

As noted in *ELECTRIC RAILWAY JOURNAL* for April 14, page 631, changes in routes and a 15-cent fare on downtown routes were included among Mr. Groner's proposals. He does not want the car rider penalized for bus deficits. Asked regarding the report, Mr. Groner stated:

After a long study of the matter, we believe we have set out the bus situation in our report and we suggest in the report that the city fix a trial period for testing our findings.

New Key System Service Authorized

The Key System Transit Company has been authorized by the California Railroad Commission to operate bus service between the City Hall in Oakland to the intersection of Webster Street and Santa Clara Avenue in Alameda. Before beginning the proposed service the company will be required to submit the complete route to the commission for its approval. Permission is also granted to the company to discontinue its present railway service on Webster Street and over the Webster Street bridge in Alameda upon the installation of the proposed bus service. In its decision the commission suggested that the company should provide transportation for the needs of the fast growing city of Oakland, to the north and to the east, instead of confining the proposed service to Broadway and Washington Streets and the area between Twelfth and Fourteenth Streets.

Joint Coach Service in Los Angeles Territory

An application has been filed by the Los Angeles Railway and the Pacific Electric Railway, both of Los Angeles, Cal., with the Railroad Commission for authority to operate under the name of the Los Angeles Motor Coach Company, coach service between Fifth and Hill Streets in the city of Los Angeles to the intersection of Wilshire Boulevard and Santa Monica Boulevard in the city of Beverly Hills. It is proposed to operate this service in conjunction with a

shuttle motor coach service for the transportation of passengers between Wilshire Boulevard and La Brea Avenue and the intersection of La Brea Avenue and Edgewood Avenue in the city of Los Angeles. When the proposed through service is started separate coach services now operated over these lines by both companies will be discontinued.

Bus Control Asked by I. C. C.

Congress gets recommendation for joint United States-local regulation differing slightly from Flynn report.
Reservations made by Commissioner Woodlock

FEDERAL legislation setting up a co-operative system of state and national regulation over motor bus operations on highways was recommended to Congress on April 21 by the Interstate Commerce Commission.

At the end of a prolonged investigation the commission adopted a report presented by Commissioner Esch, which declared that motor transportation had become "a well established and useful factor of the nation's transportation system" and that the development had been sufficient to require a regulatory system in the public interest.

At the same time the commission held the transportation of property by motor truck at the present time should not be made the subject of interstate regulation. The control proposed was recommended almost exclusively to passenger transport by motor bus lines.

Under the system proposed, state regulatory bodies would assume primary jurisdiction over the lines, acting in conjunction with each other through joint boards on which the Interstate Commerce Commission would be represented. In any state where state authority failed to appear, the Interstate Commerce Commission would assume power.

Railroads should be authorized to undertake motor operation, and all operators intending to undertake service should be required to obtain certificates from the regulatory authorities to the effect that public convenience and necessity required their service.

The report also suggested that joint rates between railroad and motor lines should be permitted, and that rates for highway transportation should be made subject to regulation, while free transportation by passes should be forbidden to bus lines as they are now forbidden to railroads.

The report closely follows the recommendations by the commission's Attorney-Examiner, Leo J. Flynn, in his tentative report issued several months ago. In general both the commission's recommendations and the examiner's report propose regulation similar to that incor-

Proposed Purchaser Would Replace Poughkeepsie Railway

John B. Marian has announced that he is ready to purchase for cash the real estate, rolling stock and franchise of the Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y. His plan is to offer to passengers a service by which, if they live off the seven established trunk lines, they would be brought to their doors for an additional 10 cents. The initial fare would be 10 cents. This presupposes substitution of buses and taxis for the railway.

porated in the Parker bill (H.R. 12380).

The principal point of difference between the tentative report and the commission's final one is the omission of regulation for trucks from the latter. In this connection the commission says:

While experience may show that the interstate transportation of property by motor vehicles operating as common carriers on the public highways should be regulated, there does not appear to be at this time public need therefor.

It is recommended, however, that interstate truck operations by carriers subject to the interstate commerce act should come under the provisions of the act. This would not apply to operation through subsidiary companies.

With respect to bus regulation the commission has made a number of changes from that of its examiner. Mr. Flynn's belief that bus operation by railroads should come within the provisions of section 15a of the interstate commerce act in determining net railway operating income is not completely shared by the commission, which thinks that possibly they should be excepted. Moreover, the commission would move up the date in the grandfather clause to one year before the opening of the session at which the law is passed, instead of March 2, 1925. Operation on such date would be *prima facie* evidence only of convenience and necessity.

As indicated previously joint rates between railroads and motor carriers would be authorized, subject to the provisions of the interstate commerce act, but the commission believes that such rates should not be required. It also believes that interstate motor carriers should be required to extend their routes if necessary in addition to furnishing more service on the same route, if needed.

Commissioner Flynn's recommendation that small carriers be exempted from regulation, at the discretion of the body in charge, is abandoned in favor of counsel to the effect that broad discretion with regard to classification of companies be allowed, but no exemptions should be permitted from provi-

sions relating to certification, liability, insurance and rates of fare.

Commissioner Thomas F. Woodlock of New York concurred in the report but made a note of his reservations in which he said:

Regulation is not in itself a good thing. The less regulation that is necessary, other things being equal, the better for the community. It is necessary in the case of public service utilities because of their semi-monopolistic nature. Transportation in general is not *per se* of such nature; transportation by railroad is. Transportation by motor bus and motor truck does not necessarily depend upon monopolistic or semi-monopolistic organization or performance.

It is manifest that at the present time these services are much more largely of a competitive than of a monopolistic nature. For that reason the need for regulation—except in so far as concerns the public safety—is not wholly clear. This being so regulation should proceed with caution and only in response to demonstrated needs.

A digest of Examiner Flynn's original report, together with the recommendations he made, was presented in *ELECTRIC RAILWAY JOURNAL* for Jan. 21, 1928, page 136, and the statements by witnesses at the hearing before the committee on interstate commerce on the Parker bill were noted in the issue of April 21.

Would Run Buses on New Hampshire Line

The Chester & Derry Electric Railway, Chester, N. H., has petitioned the Public Service Commission of New Hampshire for authority to substitute bus service for railway service between Chester and Derry.

Oklahoma Commission Hears Interstate Bus Petitions

Members of the Oklahoma Corporation Commission conferred recently with representatives of the Oklahoma Bus and Truck Operators' Association and decided that it would assume jurisdiction over all interstate bus operators under the police powers of the state, providing other existing laws do not confer jurisdiction. Hearings are being held on several applications before the Oklahoma Commission for certificates of convenience and necessity to operate interstate buses into and through Oklahoma.

Partial Substitution in Glens Falls

A declaration of abandonment by the Hudson Valley Railway of the South and Knight Street lines, the depot line and the belt line, all in the city of Glens Falls, was approved by the Public Service Commission on April 12. Decision was deferred on the company's petition for approval of abandonment of two other parts of its system, the Fort Edward-Thomson line and the Northumberland-Stillwater line. The railway would substitute bus service in Glens Falls.

Rail-Bus Service in Seattle Suburb

To provide improved transportation to the large suburban district of Green Lake, Wash., a combination bus and street car service will be installed as soon as new buses can be purchased and made ready for operation. The City Council utilities committee has approved a plan recommended by Superintendent of Seattle Municipal Railways, D. W. Henderson whereby a new bus line will be started, the bus operating north on West Green Lake Way and south on East Green Lake Way. Under this plan persons living east of the lake will ride the bus to Winona Avenue, on trips downtown where they will transfer to inbound Green Lake cars. On returning they will use the street cars to their destination. Persons living on the west side of the lake will use the street cars on trips downtown. On their home-bound trips, they will ride the cars to Woodland Park Avenue and North 55th Street, where they will transfer to a north-bound bus.

De Luxe Suburban Transit Out of Newark

Rapid progress is being made by Public Service Co-ordinated Transport, Newark, N. J., in the development of one of the latest phases of bus transportation—suburban transit by a high type of bus, designed to give additional riding comfort. The company has put many high-speed motor coaches of the latest improved models into service. They run in and out of Newark over various routes with termini at Paterson, Hackensack, Montclair, Jersey City, Elizabeth, Plainfield, the Oranges, Maplewood and Morristown. The purchase of the bus business of the Morris County Traction Company enables Public Service to operate as far as Lake

Hopatcong and to points as far north as Sussex County. No local lines are included in this service.

Buses Supply Service Over Abandoned Railway Route

Since suspension of railway service by the Centre & Clearfield Railway, Johnstown, Pa., last August the Philipsburg Motor Bus Company has been supplying service in Philipsburg and connecting Philipsburg, Grassflat and Winburne. Loss of patronage due to greater use of automobiles resulted in decreased revenues and led to the abandonment of the railway.

Bus Makes Good Showing in Springfield

A. D. Mackie, general manager of the Illinois Power Company, Springfield, Ill., and W. J. Hagenah, utilities expert, engaged by the company, testified before the Illinois Commerce Commission recently that buses operated in Springfield are netting sizable profits while the street cars are operating at a loss. The company has petitioned for increased railway fares in Springfield. Buses, representing a net investment of \$130,826, are showing a gross income of \$140,000, while electric railway traffic has fallen from 11,178,985 in 1926 to 10,616,856 in 1927. According to statements made to substantiate the contention of the company for a fare increase, a return of only 1.9 per cent is shown upon the railway investment.

Extensions Planned in Hartford

Expansion of its bus service to augment present railway service and in some instances to replace it is being considered by the Connecticut Company in Hartford, Conn., which has received a petition signed by approximately 2,500 residents, for a cross-town bus line. Alderman John B. Riddell is sponsoring this projected service and has been in conference with officials. The company is also planning a bus line to replace the Farm School railway line. It is planned to continue railway service from Hartford to Rockwell Corner via Blue Hills Avenue.

This is merely another move toward greater co-ordination of the services.



Routes of Public Service high-speed motor coaches into the city of Newark

Financial and Corporate

Washington Merger Plea

Any opposition by Congress to proposed consolidation of District of Columbia properties likely to center around \$50,000,000 valuation

THE merger of transportation companies of the District of Columbia, as provided in the Zihlman resolution, was explained to members of a subcommittee of the House Committee on the District of Columbia on April 20 by John W. Childress, chairman of the Public Utilities Commission.

The agreement of the companies, which was made voluntarily upon the suggestion of the commission that an effort be made to find the basis for unification, Mr. Childress said, was reached upon the understanding that the rate-making valuation for the new company would be \$50,000,000.

Harrison Brand, Jr., on April 23, reiterated a previous statement that he regarded as "fair and just" the valuation of \$50,000,000.

The companies receded from their original view that the valuation should be \$62,500,000, Mr. Brand said, because of the delay which would result if the commission had made a detailed valuation examination of the properties of the Washington Railway & Electric Company. Mr. Brand expressed the opinion that an exhaustive inventory of the company's properties would disclose a value which would bring the total for the two companies above \$50,000,000.

As the investigation progresses it is becoming evident that Congressional opposition to the unification plan will center around the \$50,000,000 valuation figure approved by the commission. It developed during the examination of Colonel Brand, engineer member of the commission, by Representative Gibson of Vermont on this subject that the latter had been making a study of valuation disputes in cities which had either taken over transportation lines or arranged for service-at-cost agreements.

In his reference to the fact that no depreciation had been deducted from the valuation of the property of the Capitol Traction Company, Mr. Gibson cited the case of Detroit. He said:

When the city undertook to take over the company in this Michigan city it was found that the valuation of the properties was \$31,500,000. The properties were actually taken over at a figure \$9,000,000 less than this amount. In Seattle the railway lines cost the city \$15,000,000 although a subsequent valuation placed this value at \$8,000,000.

He also referred to methods used in Milwaukee and Grand Rapids to arrive at a valuation for operation at service-at-cost, which he said proved the need for accurate depreciation deductions. He then said:

So far as I have been able to ascertain the depreciation by any method used is far in excess of what you have allowed for the purpose of this merger. Why should the situation here be any different? Do you think that these roads are kept in any better condition?

Mr. Gibson made it plain that the paving tax is "the fixed policy of Congress, which was decided upon by 500 representatives of the people.

During this discussion reference was made to a list of cities, compiled by the A.E.R.A., that have freed the railways from paving burdens. Mr. Gibson indicated that the A.E.R.A. would naturally be biased in this matter.

Montreal's Ticket Fund Considered at Annual Meeting

At the annual meeting of shareholders of the Montreal Tramways, Montréal, Que., on March 30, Julian C. Smith, the president, touching on the matter of the unredeemed ticket account, stated that the disposition of this fund had been the object of a dispute between the city and the company for some time, and that finally an agreement had been reached whereby \$500,000 was taken as sufficient to meet the company's liabilities as regards unredeemed tickets. A sum of \$621,206 was transferred to earnings, and, since all of the contract requirements had been satisfied, this sum constituted divisible surplus and was divided so that the city obtained 30 per cent, the company 20 per cent, while 50 per cent was transferred to the tolls reduction fund. Mr. Smith expressed gratification over this adjustment.

Another Offer for British Columbia Electric Railway

Reports continue to increase with respect to offers for the purchase of the British Columbia Electric Railway, Vancouver, B. C. The latest bid is from the Power Corporation of Canada, through A. J. Nesbitt of the Nesbitt, Thomson Company of Montreal. This overture is on the basis of \$57,500,000

for the property. The Lord Rothermere group bid £240 and £280, respectively, for the preferred ordinary and deferred ordinary shares. Nesbitt's first bid was £266 and £306, and Holt's bid £272 and £312. Mr. Nesbitt's second offer to directors of the railway read in part as follows:

We offer to purchase all preferred, preferred ordinary stock and deferred ordinary stock and shares of the company at the following prices: preferred ordinary, \$1,330 per \$500 nominal; deferred ordinary stock, \$1,530 per \$500 nominal of stock and shares, and so, in proportion, for smaller amounts on the following conditions:

We agree to buy and you agree to recommend all other preferred ordinary and deferred ordinary stock and shareholders to sell to us their stock and shares at the same price and on the same conditions. There will be no alteration of the articles of association or special rights attached to shares and stocks between April 19 and date of completion, May 31, 1928, or a later date, if mutually agreed on. This offer is conditional on the acceptance by not less than 75 per cent being lodged with us before May 10, 1928, or a mutually agreed date.

Situation in Baltimore Revealed

Annual report of United Railways shows falling off in transportation revenue. Net income \$535,364 without certain allowances

A NET income of \$535,364 was realized by the United Railways & Electric Company, Baltimore, Md., for the year ended Dec. 31, 1927. In the Baltimore News of April 11 President Emmons in a full-page message to the people states "approximately 29/30ths of the entire amount collected on the street cars of Baltimore was promptly paid out again in 1927 in wages, taxes, interests on borrowed money and cost of materials, the balance of 1/30th only remaining for stockholders and surplus."

At the annual meeting held on April 11 an amendment to the charter of the company permitting the issuance of preferred stock and the sales of convertible securities was adopted. The president said this action had no significance at the present time.

In the twenty-ninth annual report, that for the year ending Dec. 31, 1927, the earnings and expenses were as follows:

STATEMENT OF EARNINGS OF BALTIMORE COMPANY	
Total operating revenues	\$16,188,668
Operating expenses	\$9,987,005
Taxes assignable to railway operation	1,575,938
	11,562,944
Operating income	\$4,625,724
Non-operating income	165,656
Gross income	\$4,791,380
Fixed interest on mortgage bonds and rentals	2,309,821
Remainder	\$2,481,559
Other deductions from gross income:	
Interest on unsecured funded debt	\$376,284
Interest on income bonds	559,080
Interest on unfunded debt	84,757
Amortization of discount on funded debt	67,901
Miscellaneous	48,737
	1,136,760
Net income	\$1,344,798

Out of \$1,344,798, \$809,433 was credited to reserve for depreciation, the remainder being transferred to surplus from which dividends of \$818,448 were paid. In order to do this and to cover other necessary adjustments, the company's surplus was reduced from \$2,020,863 to \$1,588,822.

The company filed application for an increased fare in July, 1927. The case was finally decided Feb. 10, 1928. The fare was increased to 9 cents flat, 3 for 25 cents. The company has applied to the courts for a flat 10-cent fare.

Following are the results for 1927 compared with those of 1926:

COMPARATIVE INCOME STATEMENT OF BALTIMORE COMPANY

	1927	1926
Revenue from transportation	\$16,043,932	\$16,571,545
Other revenue	144,736	144,163
Total operating revenues	\$16,188,668	\$16,715,709
Operating expenses	\$9,987,005	\$9,955,019
Depreciation	809,433	835,785
Operating expenses and depreciation.....	\$10,796,439	\$10,790,804
Taxes assignable to railway operations.....	1,575,938	1,672,316
Total operating expenses, depreciation and taxes.....	\$12,372,377	\$12,463,121
<i>Ratio of Operating Expenses to Operating Revenues:</i>		
	1927	1926
Operating expenses	Per Cent 61.69	Per Cent 59.55
Depreciation	5.00	5.00
Operating expenses and depreciation.....	66.69	64.55
Taxes assignable to railway operations.....	9.73	10.00
Total operating expenses, depreciation and taxes.....	76.42	74.55

It is estimated by the company that there are approximately 18,000 to 20,000 owners of its bonds, the largest bond issue, representing about three-eighths of its total issues, being held by about 5,000 owners. All the banking capital of Baltimore, the report says, added together, does not equal today the market value of the company's outstanding securities, even at depreciated values.

"Failure to protect this vast investment," it is stated, "owned by so many of our people, will not only affect the community's welfare, but if the faith of these investors in the credit and stability of the company is lost, it is obvious that the company will have nowhere to turn to secure money with which to serve the public in the future. How will new cars be purchased, new rails laid, new electric stations built? Destroy credit and in a short time service dies with it."

In the report Mr. Emmons said that in 1926 there was some evidence that the use of private automobiles for transportation to and from business had reached its peak—gross receipts of the railway had started to pick up a little. In 1927, the trend had begun the other way; receipts began to fall off rapidly in the spring of 1927, and by July it had become evident that the company could no longer continue to operate with a 7½-cent fare.

The Baltimore Coach Company controlled by the company now owns 108 buses. Its total mileage during 1927 was 2,113,819 bus miles and its revenue showed an improvement. Reconstruction of track during the year covered 14½ miles. Reconstruction in the past nine years totaled 146.3 miles.

Rockford Railway Lines Pass to Chicago Interests

The Rockford Public Service Company, Rockford, Ill., and interurban properties operated by it have been sold to the Central Public Service Company, Chicago, which a few months ago acquired the Rockford Electric and Rockford Gas, Light & Coke companies. Adam Gschwindt, general manager of the latter two concerns, becomes manager of the railways also. The deal involved about \$2,200,000. The price represents \$1,700,000 paid eighteen months ago by T. M. Ellis, Jr., presi-

persons would ride was being charged. General Manager Bramlette testified that the competition of Lincoln Traction Company buses and of privately-owned automobiles was constantly reducing the number of revenue passengers carried; that the truck had taken most of its package and carload freight movements and that it had lost its mail-carrying contract.

A total of \$316,566 is now invested in the property. Total revenues last year were \$42,695, while operating expenses were \$56,439.

Change in Richmond Company's Capitalization

Directors of the Virginia Electric & Power Company, Richmond, Va., have been authorized to issue, in their discretion, \$8,000,000 in first and refunding mortgage gold bonds. They have also been authorized to file with the State Corporation Commission an amendment to the company's charter so as to provide for an increase of \$5,000,000 in 6 per cent cumulative authorized preferred stock.

It is regarded as likely that \$3,000,000 in 6 per cent cumulative preferred stock will be issued this year to cover improvements and developments undertaken by the company to increase industrial power facilities in tidewater Virginia and northeastern North Carolina.

Rainier Line Puts Burden on Seattle Municipal

The problems of the Seattle & Rainier Valley Railway, Seattle, Wash., are adding to the financial difficulties that beset the city-owned railway line, Clark R. Jackson, superintendent of utilities, recently advised the City Council. He said that the Rainier Valley Company was in arrears \$9,500 to the Seattle Municipal Railway for material purchased and for an amount due on a transfer exchange, with the sum increasing monthly. Moreover the arrears were increasing at the rate of \$650 a month. Efforts to collect had met with explanations by the Rainier Valley officials that the company's financial condition precluded payment. The City Council appointed Councilmen Blaine and Erickson as a committee of investigation.

Loss in Fresno

The Fresno Traction Company, Fresno, Cal., reports to the Railroad Commission its 1927 operating revenue at \$324,071, compared with \$334,087 in 1926. Operating expenses, excluding taxes for 1927 were \$313,268 and for 1926, \$318,678. During 1927 tax charges were \$19,729 and in 1926 \$18,769. The gross corporate income representing the amount available for interest, amortization of debt discount other fixed charges, non-operating expenses, dividends and surplus was a loss in 1927 of \$15,908, compared with a loss in 1926 of \$10,382.

dent and majority stockholder, for the lines, \$316,000 spent on improvements and 10 per cent for intangibles.

The utilities involved in the sale are the Rockford city traction lines and feeder buses; Rockford, Beloit & Janesville Electric Company; Rockford & Freeport Interurban Company, the Roscoe Electric Company and the Rockford, Belvidere & Elgin interurban, owned by Mr. Ellis and B. J. Arnold of Chicago. When the railway lines went into receivership on Feb. 5, 1926, Mr. Gschwindt was named receiver and a year later Mr. Ellis bought in the properties.

Mr. Ellis retains ownership of the railway at Beloit.

Object to Suspension of Lincoln Interurban

The Omaha, Lincoln & Beatrice Railway, Lincoln, Neb., encountered stiff resistance before the State Railway Commission at the hearing on its application for permission to suspend service and take up its tracks. Patrons from the territory served claimed they had located in that section because of the car service, and business houses objected because the company held out that they would have permanent rail connection with the outside railroad world. It has been suggested that the road be leased to another operator and that service be reduced and that fares be raised.

City Attorney Peterson admitted that if the operation of the road resulted in capital losses its continuance could not be forced, but insisted that it had not been shown that the maximum fare at which

Net Income on Interurban \$253,946

Texas Electric Railway reports decrease in operating expenses in 1927. Cost of improvements higher. Service better. Recommendation for amended charter

GROSS earnings of the Texas Electric Railway, Dallas, Texas, for the year ended Dec. 31, 1927, were \$1,867,063 compared with \$2,038,713 for the preceding year. These earnings for the two years named were made up from the following principal items:

	1927	1926
Passenger.....	\$1,536,342	\$1,692,142
Mail.....	26,521	26,827
Express.....	249,520	258,279
Rents of tracks and terminals	25,770	32,005
Rents of buildings and other property.....	13,549	14,395
Miscellaneous.....	15,357	15,062

The net income after charges but before depreciation was \$253,946 compared with \$250,769 for the year 1926. These facts were contained in the annual report submitted to the stockholders.

Operating expenses for the year totaled \$1,123,169 compared with \$1,260,393 for 1926. Included in this decrease is an allowance of \$52,500 made to the company by the Texas Power & Light Company upon power bills for the year. Included in the operating expenses for the year 1926 was a similar allowance of \$15,000. Taxes assessed against the company for the year 1927 were \$70,776 compared with an assessment for the previous year of \$99,725. Through an act of the State Legislature, effective June 14, 1927, the tax upon the gross receipts of interurban and street railways was repealed and such companies made subject to the franchise tax imposed upon corporations, generally. This change of law effected a substantial saving according to the report of the company. The balance of the decrease was almost entirely due to a reduction in ad valorem taxes. Interest charges for the year amounted to \$419,170 compared with \$427,825 for the previous year.

During 1927 the Texas Electric Railway spent for maintenance of roadway and equipment \$370,400 or \$90,650 in excess of the mortgage requirement, which stipulates 15 per cent of its gross revenue annually for this expense. Since Jan. 1, 1917, the company has spent for maintenance purposes \$4,935,544 or \$903,300 in excess of what it was required to spend under the mortgage requirement.

The management has set aside with the approval of the directors, an additional sum of \$100,000 from surplus into renewal and replacement reserve to be used as found necessary and advisable for further maintenance and up-building of the property. Since Jan. 1, 1917, the surplus earnings and reserves of the company have been largely invested in improvements of and additions to the property, and since that time investments of this kind have been made in the sum of \$2,040,333. Of this amount the sum of \$975,401 represents a fundable investment against which new securities were issuable. Additional bonds in

the amount of \$500,000 have already been issued against these improvements but have not been sold. Additions, improvements, renewals and replacements were made in 1927 costing \$115,881 compared with \$95,477 for the previous year.

The net current indebtedness of the company on Jan. 1, 1927, excluding bonds, debentures and a real estate note but including accumulated interest upon such real estate note and including all other notes and accounts payable less current accounts receivable was \$164,000. On Jan. 1, 1928, such net current indebtedness was approximately \$99,000.

Without considering the floating indebtedness of approximately \$99,000 with which the year 1928 was entered the company will expect obligations during the year as follows:

Operating expenses (estimated by James P. Griffin, vice-president in charge of operation).....	\$1,195,830
This item includes an estimated cost of express operation for the last four months of the year of \$49,730.	
Taxes (estimated).....	66,600
Interest.....	410,824
Sinking fund requirements.....	84,500
Total cash requirements for the purposes named.....	\$1,757,754

In addition cash to the amount of approximately \$110,000 will be required during the year to take care of re-

INCOME ACCOUNT OF THE TEXAS ELECTRIC RAILWAY FOR THE YEAR ENDED DEC. 31, 1927, AND SUMMARY OF SURPLUS ACCOUNT

Gross earnings from operations.....	\$1,864,999
Operating expenses and taxes.....	*1,189,379
Net earnings from operations.....	\$675,619
Add interest on bank balances.....	2,063
Total net earnings before depreciation	\$677,682
Interest deductions.....	419,170

Surplus net income before depreciation *\$258,512

SUMMARY OF SURPLUS ACCOUNT

Balance Jan. 1, 1927, per previous certificate.....	\$1,484,240
Add:	

Surplus net income before depreciation for the year ended Dec. 31, 1927, as above..... \$258,512

Less — Provision for depreciation (retirements).... *104,566 \$153,946

Sundry direct items—
Discount on Texas Traction Company bonds purchased for sinking fund... 17,205 171,151

Surplus balance Dec. 31, 1927, per balance sheet.... \$1,655,391

*Provision for depreciation includes \$4,566 bus retirement expense.

newals, replacements and new construction. President Jack Beall stated in the report that although receipts for the year declined and the necessity for rigid economy was urgent, substantial improvements were made upon the property resulting in much better service.

The report comments on the bus legislation of 1927 which permits the state to issue to bus lines certificates of convenience and necessity "when the agency of the state is forbidden to consider whether existing railway and in-

Conspectus of Indexes for April, 1928

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares* 1913 = 4.84	April 1928 7.61	March 1928 7.61	April 1927 7.43	March 1928 7.61	May 1923 6.88
Electric Railway Materials* 1913 = 100	April 1928 140.0	March 1928 140.1	April 1927 148.0	Sept. 1920 247.5	Feb. 1928 139.5
Electric Railway Wages* 1913 = 100	April 1928 228.8	March 1928 228.8	April 1927 226.9	Sept. 1920 232	March 1923 206.8
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	April 1928 201.2	March 1928 200.5	April 1927 202.6	July 1920 256.4	May 1922 167.4
Eng. News-Record Construction Cost (General) 1913 = 100	April 1928 206.4	March 1928 204.6	April 1927 209.0	June 1920 273.8	March 1922 162.0
U. S. Bur. Lab. Stat. Wholesale Commodities† 1926 = 100	March 1928 96.0	Feb. 1928 96.4	March 1927 94.5	July 1920 100	May 1922 100
Bradstreet Wholesale Commodities 1913 = 9.21	Apr. 1 1928 13.42	Mar. 1 1928 13.34	Apr. 1 1927 12.53	Feb. 1 1920 20.87	June 1 1921 10.62
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	March 1928 151.4	Feb. 1928 151.6	March 1927 153.8	July 1920 219.2	June 1922 138.7
Nat. Ind. Conf. Bd. Cost of Living 1914 = 100	March 1928 161.1	Feb. 1928 161.5	March 1927 164.1	July 1920 204.5	Aug. 1922 154.5
Steel Unfilled Orders (Million Tons) 1913 = 5.91	Mar. 31 1928 4.335	Feb. 29 1928 4.398	Mar. 31 1927 3.553	July 31 1920 11.118	May 31 1927 3.051
Bank Clearings Outside N. Y. City (Billions)	March 1928 19.72	Feb. 1928 16.99	March 1927 19.53	Oct. 1925 20.47	Feb. 1921 10.43
Business Failures Number	March 1928 2007	Feb. 1928 1885	March 1927 1882	Jan. 1924 2231	Aug. 1925 1353
Liabilities (Millions)	March 1928 51.54	Feb. 1928 50.62	March 1927 99.26	Jan. 1924 122.95	Aug. 1925 27.22

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

†This index is changed to a base of "1926 = 100." That notation replaces the former basis of "1913 = 100." Inasmuch as the bureau has not calculated the index on this new base any further back than January, 1923, no figures are shown in this tabulation for the high and low points since the war. It is planned to compute the index on the new basis as far back as January, 1913. Until such time as the bureau makes public these figures for the earlier years this information will be lacking.

terurban lines may not be sufficient to meet completely all transportation needs." Bus competition was extended on the Texas Electric Railway lines during 1927. In most, if not all instances competing bus lines are charging fares substantially less than interurban rates.

President Beall recommends in his report the amendment of the present charter so as to give the company an enlarged corporate authority. Such action will result in placing the company under jurisdiction of the Railroad Commission of Texas and probably under the jurisdiction of the Interstate Commerce Commission.

Beach Property Withdrawn from Sale by Pacific Electric

D. W. Pontius, acting for the Pacific Electric Railway, Los Angeles, Cal., has withdrawn from the market three-quarters of a mile of beach frontage at Redondo Beach, which has been proposed for subdivision. He did so at the request of the citizens' committee on parks, playgrounds and beaches of the Chamber of Commerce. Mr. Pontius was reported to have said:

The Pacific Electric Railway has always felt that this beach frontage should be publicly owned and on several occasions has expressed a willingness to sell to the city or the county at a figure below its actual market value. The present withdrawal of the property from the market, which is for a definite period of months, is a further indication of the recognition by the Pacific Electric of the public need for this beach frontage. The period for which the withdrawal is effective will allow time for the necessary action by the interested public bodies to obtain this beach for the public forever.

Discontinuance Between Warren and Sheffield

The Penn Public Service Corporation, Warren, Pa., operating the Warren & Jamestown Street Railway and the Warren Street Railway, Warren, Pa., on April 1 discontinued service on its interurban line between Warren and Sheffield, Pa., a one-way distance of about 13 miles. Workmen are engaged in removing the tracks and poles along the line.

Another Move Toward Ending Binghamton Receivership

Mortimer B. Fuller, who at the time of the appointment of receivers for the company is understood to have controlled the majority of the stock of the Binghamton Railway, Binghamton, N. Y., is said since then to have acquired additional shares and also bonds of the company, until at the present time he controls practically all outstanding capital stock and bonds. It is thought now Mr. Fuller is anxious to have the sale consummated. Once this is done, he will be in a position to develop the properties, provided he is the successful bidder for the assets of the company. As a move in the direction toward lifting the receivership William

H. Hecox, William G. Phelps, Thomas J. Keenan, F. W. Ogden, W. H. Morse, A. J. Parsons and Frank L. Fuller have all resigned as directors of the company.

System at Akron Does Well

Combined results very satisfactory. Railway revenue holds up, but transportation recovery not so full as expected

BUSINESS conditions in 1927, in the territory served by the Northern Ohio Power & Light Company, Akron, Ohio, were generally favorable and were reflected in the increased sales of electricity by the company. The transportation department, however, suffered a loss in traffic due mainly to the increased use of privately owned automobiles. To meet this situation and to be relieved of heavy replacement expenditures incident to highway improvement where rail lines are located, the management has taken steps to replace certain interurban car routes with bus service and otherwise to devise ways and means of bettering the earnings of the transportation department. The income available for dividends in 1927 was \$2,197,688, compared with \$1,397,208 in 1926.

ONLY SLIGHTLY FEWER PASSENGERS CARRIED

Gross earnings of the transportation department increased \$20,688, or 0.36 per cent over 1926. Partial suspension of transportation service due to a strike of certain employees in May, 1926, adversely affected both passenger riding and revenue in that year and a greater recovery naturally was anticipated in 1927. That this recovery was not realized is accounted for by continued increases in the number and use of privately owned automobiles. However, economies effected in operation, particularly in the transportation department, together with the benefits derived from capital expenditures previously made, resulted, in a substantial increase in total net income for 1927.

The number of revenue passengers carried by the transportation department showed decreases on both the city and interurban systems, as compared with 1926. In the case of the city systems, the decrease was 1,044,393 passengers, or 2.13 per cent, and in the case of the interurban systems, the decrease was 501,390 passengers, or 3.48 per cent.

REVENUE PASSENGERS CARRIED BY N.O.P. RAIL AND BUSES

Years	City Systems	Interurban Systems
1923.....	54,112,423	16,784,535
1924.....	48,563,053	14,478,984
1925.....	51,352,849	14,266,754
1926.....	48,973,671	14,398,663
1927.....	47,929,278	13,897,273

During the year the company handled 140,523 tons of freight, yielding a gross revenue of \$611,696—approximately the same tonnage and revenue as reported for the preceding year.

The capital expenditures of the company in 1927 were \$2,143,913. Of this amount, \$1,372,315, or 64.01 per cent,

STATEMENT OF EARNINGS OF NORTHERN OHIO POWER & LIGHT COMPANY

Gross:	1927	1926
Electric.....	\$6,815,900	\$6,317,554
Transportation.....	5,743,975	5,723,286
Total.....	\$12,559,876	\$12,040,840
Operating expenses and taxes:		
Operating expenses.....	\$7,774,085	\$8,181,133
Taxes.....	890,800	802,200
Total.....	\$8,664,885	\$8,983,333
Gross income.....	\$3,894,990	\$3,057,507
Interest—net.....	\$1,575,677	\$1,527,628
Amortization of debt discount and expense.....	121,624	132,670
Total.....	\$1,697,301	\$1,660,299
Net income available for dividends and retirement reserve.....	\$2,197,688	\$1,397,208
Dividends on preferred stock	\$512,108	\$473,824
Provision for retirement reserve.....	700,000	400,000
Total.....	\$1,212,108	\$873,824
Balance.....	\$985,579	\$523,383
Ratio of operating expenses to gross earnings, per cent.	61.90	67.94
Ratio of operating expenses and taxes to gross earnings, per cent.....	68.99	74.61

was used in the electric department, \$732,099, or 34.15 per cent, in the transportation department and the remaining \$39,498, or 1.84 per cent, was used for general purposes.

The more important property additions and improvements in the transportation department during the year were as follows:

Purchase of ten 29-passenger and one 44-passenger city type buses for service in Akron and purchase of ten 29-passenger buses and fourteen 29-passenger bus bodies for use in the interurban service.

Renewal and reconstruction of track, both interurban and city, at various places on the system.

During the five-year period ended Dec. 31, 1927, the capital expenditures of the company were \$12,595,297.

The safety and accident prevention department contributed very materially to safe operation during 1927. Total accidents decreased approximately 9 per cent, as compared with results reported in 1926, and the number of vehicle and car collisions was again reduced. The very effective work accomplished in the company's training school for car and bus operators is cited as one of the important factors which contributed to this record.

Wisconsin Public Service Issues Report

Gross earnings of the Wisconsin Public Service Corporation, Milwaukee, Wis., and subsidiary for the year ended Dec. 31, 1927, increased 4.97 per cent, and net earnings 2.07 per cent. According to the report of Halford Erickson, president, the transportation system in Manitowoc and between Manitowoc and Two Rivers was improved by the substitution of buses for railway service. The report referred to the intention of the company to replace the railway system in Marinette-Menominee by modern buses.

Good Year Reported by Ogden Property

An income balance of \$42,476 was transferred to profit and loss by the Utah-Idaho Central Railroad, Ogden, Utah, for its 1927 operations. The company closed the year with a total corporate surplus of \$803,916, which was \$68,997 more than at the close of 1926. A profit of \$6,587 was realized from the 1927 operation of its bus line between Ogden, Utah, and Preston, Idaho.

Redemption of Illinois Power & Light Issue Sanctioned

Stockholders of the Illinois Power & Light Corporation, Chicago, Ill., have approved the creation of an issue of 600,000 shares of no par preferred stock entitled to cumulative dividends up to \$6 annually, and have authorized an increase in the callable price of the present 6 per cent preferred to 110 from 105. The new preferred will rank equally with the 6 per cent issue excepting in

the dividend terms. It is proposed to call for redemption all the outstanding 7 per cent preferred at 105 and accrued dividends, the holders to be given the opportunity to exchange their stock for the new \$6 preferred on a favorable basis.

Abandonment of Indiana Line Approved

The Indiana Public Service Commission has approved an order of the Vanderburg County Probate Court in Evansville, Ind., authorizing William A. Carson, receiver of the Evansville & Ohio Valley Railway, Evansville, Ind., to abandon the Henderson division line of the road.

Short Line in Pennsylvania Abandoned

The Allen Street Railway, Nazareth, Pa., discontinued operation on Jan. 24, 1928. The line was 5 miles long, reaching the towns of Bath and Nazareth.

the company at Providence more than 30 years.

Superintendents of eight divisions which have been created have been appointed as follows: Jacob M. Rounds, Paul T. Breese, Frank H. Brown, George S. Amidon, William A. Andrews, William D. Mathewson, Edward J. Coffield and Eugene E. Hargraves.

Obituary

Elias Elkan Ries

Elias Elkan Ries, long identified with many branches of the electrical industry through his inventions, died on April 20 at his home in New York City at the age of 65. Mr. Ries is credited with having taken out more than 250 patents, mostly in the electrical field. They included equipment for telephones for alternating-current distribution, incandescent lamps and electric motors and energy distribution for electric railways. Many of his basic patents were purchased in 1903 by the Westinghouse Electric & Manufacturing Company.

Mr. Ries was born in Baden, Germany, in 1862. He moved to this country with his parents in 1865. At an early age he was connected with the Western Union Telegraph Company, the Edison Manufacturing Company and others. He studied physics at Johns Hopkins University, Baltimore, Md., and for many years was a resident of that city.

Personal Items

W. J. Beadle Leaves Philadelphia

W. J. Beadle, transportation and traffic consultant for Mitten Management, Inc., Philadelphia, Pa., has accepted a position with E. I. du Pont de Nemours & Company, Wilmington, Del. He will leave Mitten Management on May 1 to assume his new duties in the development department of the du Pont organization. He has been a member of the Mitten Management and Philadelphia Rapid Transit Company organizations for several years, serving first in the traffic department as an assistant to the traffic engineer; later becoming traffic engineer, and then transportation manager. In 1927 he left the operating forces of the latter company to carry on a number of transportation and traffic research problems for Mitten Management.

Before going with the Philadelphia Rapid Transit Mr. Beadle was a member of the engineering department of the National Aniline Company. He was graduated from the Massachusetts Institute of Technology in 1917. During the World War he saw active service in France in the infantry.

F. M. Mills Active Railway President at 97

F. M. Mills, president of the Sioux Falls Traction System, Sioux Falls, S. D., celebrated his 97th birthday recently. Twenty-one years ago at the age of 76, Mr. Mills went to Sioux Falls and started the Sioux Falls Traction Company. Although today a large part of the work is in the hands of his son, Roger Mills, F. M. Mills still takes an

active part in the road's operation. Last June Mr. Mills was given an honorary M.A. degree by his alma mater, Wabash College. In 1921 the college, conferred a B.A. degree on him.

Messrs. Anderson, Lockhart and Hackett Advanced at Providence

R. Roscoe Anderson, for many years superintendent of transportation, has been promoted to the post of general superintendent of operations of the United Electric Railways, Providence, R. I. At the same time, announcement was made by Alonzo R. Williams, general manager, of the promotion of Joseph A. Lockhart to assistant superintendent of transportation and James A. Hackett to supervisor of traffic.

General supervision of all transportation matters, with particular reference to important constructive studies of the system as a whole and the development of plans for the future needs, will be in the hands of Mr. Anderson.

All operations in the transportation department as far as the passenger service is concerned will be supervised by Mr. Lockhart.

All matters pertaining to the various carhouses on the system and all operations of the company will be under the immediate supervision of Mr. Hackett. He will represent the general manager, the general superintendent and the assistant superintendent of transportation throughout the system.

Mr. Lockhart has been with the company 23 years and has been connected with the claim department and various departments in the transportation system. Mr. Hackett has been in the employ of

HARRY C. SANFORD, chief engineer of the Rosoff Subway Construction Company, died on April 22 in the Englewood, N. J., Hospital. Mr. Sanford had directed much of the important subway building in New York in recent years. After he was graduated from Valparaiso University in 1889 he joined John B. McDonald, the contractor for New York's first subway, and later helped him to construct the Akron & Chicago Junction Railway. He moved to Baltimore with the firm of Ryan & McDonald and participated in the construction of the tunnels of the Baltimore Belt Railway. For the Degnon Construction Company of New York City, with which he was associated for many years, he directed as chief engineer the construction of the 42nd Street Subway from Fourth Avenue to Broadway, the Steinway Tunnel under the East River and the Hudson & Manhattan tube under Sixth Avenue from Ninth Street to 33d Street. Mr. Sanford was 58 years old.

WILLIAM JEFFERSON PAYNE, railway investor and newspaper publisher, died recently at a Richmond, Va., hospital. For a number of years, and until 1914, he owned and operated the entire railway system in Newport News, Hampton and Old Point. He built the railway system in Danville. Colonel Payne was 65 years old.

Manufactures and the Markets

D. L. & W. Electrification Orders Likely Soon

Orders for the Lackawanna electrification, mentioned in detail on page 707, will probably be placed within the next 60 days. The Delaware, Lackawanna & Western Railroad, New York, N. Y., has appointed Jackson & Moreland, Boston, Mass., engineers to carry out its electrification program. The electrification as planned will cost approximately \$14,000,000, and if the railroad constructs its own power house the cost will be about \$18,000,000.

New Exhibit Space at A.E.R.A. Convention

To take care of the ever-increasing demand for exhibit space at the Cleveland convention of the American Electric Railway Association, there has been added this year 19,000 sq.ft. of space, making a total of 135,000 sq.ft. net of exhibition floor for the exhibits.

In the exhibition hall new sections have been added in both the north and south ends. The north-end addition includes exhibit space and a new room seating 500 persons for engineers and way and structures meetings. The space formerly occupied by the engineers, accountants and claims meeting

rooms is now devoted to exhibits. The new section on the south end of the hall includes an exhibition hall and dining room.

The registration and information booth has been moved to the new lobby at the entrance of the arena floor on the Lakeside Avenue side. This will be used as the main entrance this year and there will be no entrances on the Sixth Street side of the auditorium proper, as was the case last year. Over the new entrance lobby is a floor of meeting rooms, offices, lounging and rest rooms, etc. Above these there is a ballroom with stage.

The auditorium annex will be divided into three sections, the south end being used for automotive tools and shop equipment, the center being occupied by motor coaches, trucks and chassis exhibits and the north end used for street car and automotive accessories. The space occupied last year as a meeting room for the American Association is now used for exhibits.

It is noted that spaces in the Esplanade, or Section E, have been enlarged. This location proved to be very popular in 1926 and 1927 the space being inclosed and protected from the weather, coupled with the further fact that it is the principal walkway to the Auditorium Annex, makes it particularly desirable from the exhibitors standpoint.

Exhibitograph No. 6

THEY'RE OFF

to a splendid start this year. With applications for exhibit space at the 47th annual convention of the A.E.R.A. in the mails less than two weeks, Director of Exhibits Fred Dell reports

83

applications totaling requests for

51,403

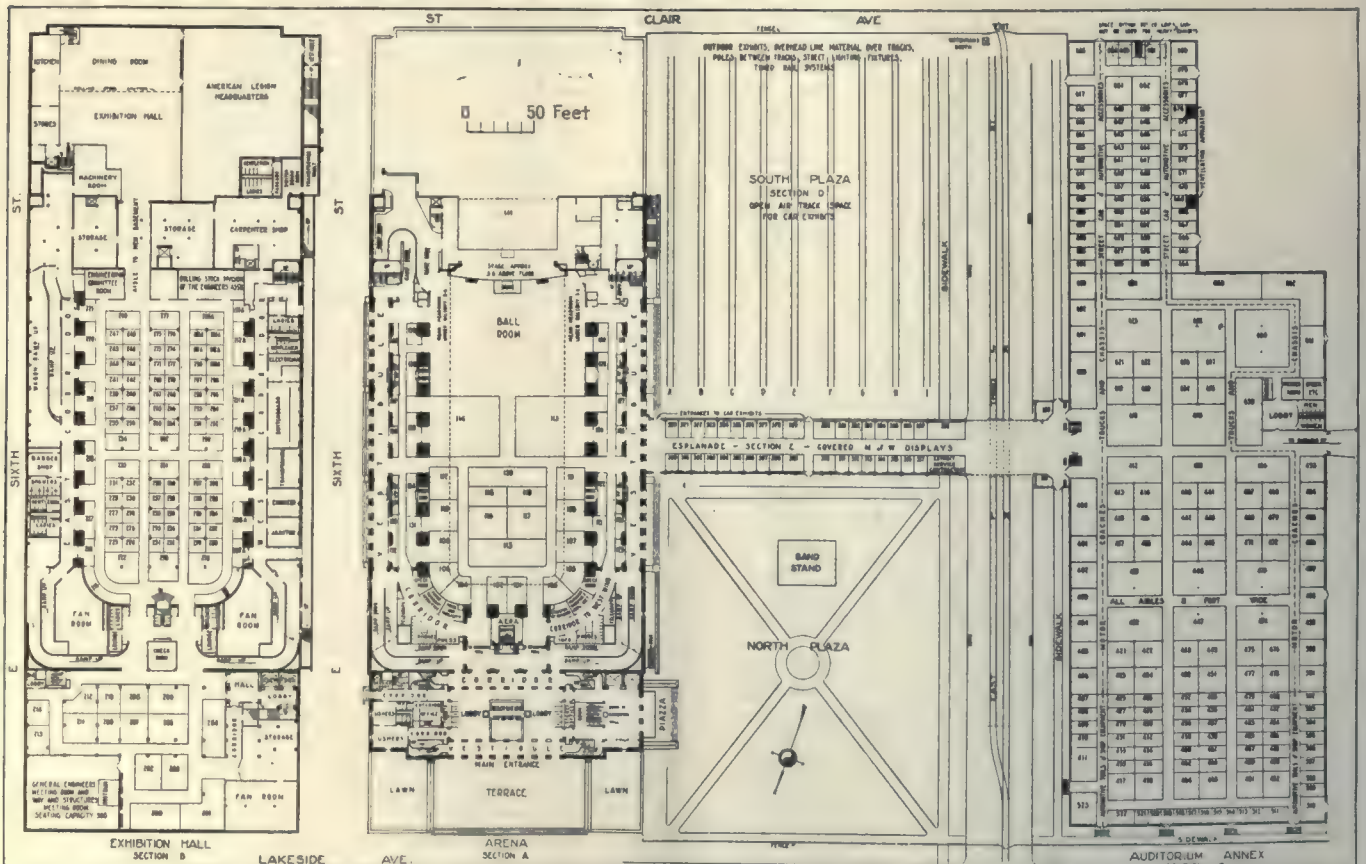
sq.ft. of space

It Won't Be Long Now

Get Your Application In Before
May 14

The South plaza occupied by the outdoor exhibits is similar to last year, there being more than 3,000 lineal feet of track space for car displays. With the exhibitors occupying one-sixth more space than usual, the convention should be the greatest ever held. Fred Dell, director of exhibits, states:

"If you have not yet filed your application for space, don't delay it. A.E.R.A. headquarters report a very heavy space request after the applications are out less than two weeks and it is feared that even with the 19,000 sq.ft. additional provided this year, space will be at a premium and there will be a waiting list of late comers by June 1."



Official floor plan of the Public Auditorium buildings and plaza, Cleveland, Ohio, where the 47th annual convention of the American Electric Railway Association will be held, from Sept. 22 to 28 inclusive



The new steel cars operating on the Shin Keihan lines between Osaka and Kyoto

33 Steel Cars Purchased in Japan

The Shin Keihan, Osaka, Japan, has recently purchased 33 all-steel motor cars from Kisha Seizo Kaisha, Nippon Sharyo. The new cars are to be operated between Osaka and Kyoto, a distance of 28½ miles. The cars are 63 ft. long, 9 ft. 6 in. wide and weigh 122,000 lb.

Each car is equipped with four 200-hp. motors, pneumatic-door engines, MBC type couplers with friction draft gears, and the air brakes are schedule AMU-1612 equipment. Camshaft control and pantographs are used. The track gage is 4 ft. 8½ in. and the line voltage is 1,500. The train make-up is from two to three motor cars and four trailer cars. The express schedule speed between Osaka and Kyoto, with four station stops, is 38 m.p.h. The maximum speed is 65 m.p.h.

International Plans Extension

Extension of the Main Street car line in Buffalo, N. Y., from the city line to Bailey Avenue in the town of Amherst, a residential subdivision, has been proposed to the International Railway by the Buffalo City Planning Committee. Bernard J. Yungbluth, president of the railway company, already has had a conference with the municipal planning commission regarding possible extension of the Main Street line.

Manufacturers of Wrought Iron Form Association

Representatives of the leading manufacturers of wrought iron in various parts of the country met at the Duquesne Club, Pittsburgh, Pa., on April 5, and formed the Wrought Iron Research Association, the principal object of which is to gather and disseminate information about this time-honored metal.

The members of the Association are the American Swedo Iron Company, Philadelphia, Pa.; the Burden Iron Company, Troy, N. Y.; A. M. Byers Company, Pittsburgh, Pa.; Cohoes Rolling

Mill Company, Cohoes, N. Y.; Ewald Iron Company, Louisville, Ky.; Glasgow Iron Company, Philadelphia, Pa.; Highland Iron and Steel Company, Chicago, Ill.; Hughes & Patterson, Philadelphia, Pa.; Logan Iron & Steel Company, Philadelphia, Pa.; Lockhart Iron & Steel Company, Pittsburgh, Pa.; Penn Iron & Steel Company, and Pittsburgh Forge & Iron Company, both of Pittsburgh, Pa.; Reading Iron Company, Reading, Pa.; and Ulster Iron Works, Dover, N. J.

The association will endeavor to furnish engineers and laymen alike, dependable information about the uses and properties of wrought iron, and a publicity campaign will be started immediately, necessary funds having been provided. Headquarters of the association will be in Pittsburgh, Pa.

Third Avenue Railway Receives Buses

The Third Avenue Railway, New York, has received 36 new buses which are all to be used in the Bronx Borough of New York City. The chassis are Safeway Six Wheelers, manufactured by the Six Wheel Company, Philadelphia, Pa. The bodies are of the all-steel frame, 29-passenger type made by the Lang Body Company, Cleveland, Ohio.

These buses are equipped with National Pneumatic treadle-operated double-leaf rear exit doors in which Danger Shield glass is used. Other equipment consists of Flexolite floors,

Nichols-Lintern heaters and ventilators, and Cass step treads. The bodies are 8 ft. wide with 76-in. headroom. They are finished in lacquer, red and cream exteriors with walnut interiors and white ceilings.

American Brake Shoe to Control National Bearing

The proposal of the directors of the American Brake Shoe & Foundry Company to acquire a substantial interest in the National Bearing Metals Corporation was approved by the stockholders at the annual meeting.

It is planned to purchase preferred stock of the National Bearing Metals Corporation for cash and to acquire the common by exchange for Brake Shoe common stock.

American Brake Shoe plans to acquire 30,000 shares of National Bearing Metals common stock on the basis of three shares of Brake Shoe common for four shares of Bearing Metals. This, with a small lot of stock already owned, will give Brake Shoe control of the Bearing Metals Corporation, which has 60,000 common shares.

The transaction will increase Brake Shoe's common capital to 670,624 common shares.

Seattle Considers Bids On Buses

On March 1 the railway division of the Public Utilities Department of the City of Seattle, Wash., called for bids on ten passenger buses, five to be 21-passenger and five to be 29-passenger type. Seven bids have been received and the railway division recommends to the City Council the purchase of five 29-passenger Mack-International buses and five 21-passenger Studebaker buses.

If bus service is to be installed in the Green Lake district, the purchase of seven Studebaker 21-passenger buses is recommended. The City Council has decided to hold the bids under consideration for another week.

Col. Douglas I. McKay Elected to Martin Parry Board

Douglas I. McKay, president of the Standard Coupler Company, was recently elected to the board of directors of the Martin Parry Corporation, manufacturer of commercial auto bodies.



One of the 36 new buses recently delivered to the Third Avenue Railway, New York

Before the war Colonel McKay was vice-president of the J. G. White Company. He is a conspicuous example of a West Point-trained army officer who has attained success not only in the engineering field but also in business life. He has proved his interest in civic matters, having served not only as former Police Commissioner of New York City but also as County Commander of the Westchester post of the American Legion.

\$50,000 Chicago "L" Terminal Under Way

A \$50,000 station at the Logan Square terminal of the metropolitan west side division is being constructed by the Chicago Rapid Transit Company, Chicago, Ill. The exterior of the new terminal building will be white terra cotta, with old English style mission-brick panels and will conform in general style to other new stations recently erected by the company. A. U. Gerber is the architect of the new station, which will be completed about July 1.

ROLLING STOCK

SEATTLE MUNICIPAL STREET RAILWAY, Seattle, Wash., will order 100 cars from the St. Louis Car Company. The cars will be similar to the 1300 series now being used by the St. Louis Public Service Company. The contract for them will probably be signed in June.

NORTHWESTERN PACIFIC RAILROAD, San Francisco, Cal., is preparing specifications for five new motor cars and five new trailer cars.

OHIO VALLEY BUS COMPANY, Huntington, W. Va., has ordered two 20-passenger buses from the Studebaker Corporation, South Bend, Ind.

DETROIT DEPARTMENT OF STREET RAILWAYS, Detroit, Mich., has been authorized by the Street Railway Commission to sell seventeen one-man safety cars, which have been in use seven years, at a price of \$3,000 each. The purchase of a new motor coach at a cost of \$4,000 was also authorized at the same time to supplement the present bus service between the downtown hotel district and the Ford Airport at Dearborn, Mich.

PUBLIC SERVICE CO-ORDINATED TRANSPORT, Newark, N. J., has accepted delivery on three Mack six-cylinder 29-passenger city type buses.

VAN SWERINGENS, identified with the New York, Chicago & St. Louis Railroad, Cleveland, Ohio, have asked for bids on 25 150-ton electric locomotives, the delivery date to be Jan. 30, 1930.

TEXAS MOTOR COACHES, Fort Worth, Texas, a Stone & Webster operation, has accepted delivery of six Mack four-

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	April 24, 1928
Metals—New York	
Copper, electrolytic, cents per lb.	14.00
Copper wire, cents per lb.	16.00
Lead, cents per lb.	6.10
Zinc, cents per lb.	6.15
Tin, Straits, cents per lb.	52.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	4.225
Somerset mine run, Boston, net tons.	1.875
Pittsburgh mine run, Pittsburgh, net tons.	1.95
Franklin, Ill., screenings, Chicago, net tons.	1.825
Central, Ill., screenings, Chicago, net tons.	1.675
Kansas screenings, Kansas City, net tons.	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	5.30
Weatherproof wire base, N. Y., cents per lb.	16.5125
Cement, Chicago net prices, without bags.	2.05
Linseed oil (5-bbl. lots), N. Y., cents per lb.	10.20
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.25
Turpentine (bbl. lots), N. Y., per gal.	\$0.595

cylinder Parlor Car chassis, 230-inch wheelbase, 25-passenger capacity. The bodies will be built by Lang.

ILLINOIS POWER & LIGHT CORPORATION, Peoria, Ill., has received five 30-passenger A.C.F. urban coaches.

KANSAS CITY PUBLIC SERVICE COMPANY, Kansas City, Mo., will probably purchase some new buses if the rerouting plan, submitted to the City Council, is passed. The Yellow Truck & Coach Manufacturing Company is sending a new single-deck bus to the company for trial purposes.

BOSTON ELEVATED RAILWAY, Boston, Mass., has received four A.C.F. gas-electric metropolitan coaches.

SHOPS AND BUILDINGS

SAN ANTONIO PUBLIC SERVICE COMPANY, San Antonio, Tex., will add a 40,000-hp. unit to its Comal plant.

CHICAGO, SOUTH SHORE & SOUTH BEND RAILROAD, Michigan City, Ind., is planning an addition to its new receiving and shipping station in South Bend, Ind.

TRACK AND LINE

DETROIT DEPARTMENT OF STREET RAILWAYS, Detroit, Mich., will determine the cost of purchasing from the Detroit United Railway, the private tracks on Grand River Avenue between Meyers Road and Redford, the franchise for which expired recently. The Department of Street Railways has been renting these tracks at 7½ cents per car-mile, amounting to about \$75,000 per year.

CHICAGO, SOUTH SHORE & SOUTH BEND RAILROAD, Michigan City, Ind., will spend approximately \$50,000 installing a high-speed passing track at Tamarack, 4 miles west of Michigan City. On the Oak Hill-Sheridan section, track relaying has been started. Ten and a half miles of 100-lb. rail is to be installed before July 1 at a cost of about \$150,000.

TRADE NOTES

VERSARE CORPORATION, Albany, N. Y., has appointed R. A. Nash as special representative with headquarters in Cleveland, Ohio. Mr. Nash is a graduate mechanical engineer from Rutgers and has been for seven years superintendent of equipment for the United Traction Company, Albany, N. Y., for two years sales engineer for the Electric Service Supplies Company, Philadelphia, Pa., and for 2½ years district representative of the Yellow Truck & Coach Manufacturing Company, Chicago, Ill.

WRIGHT MANUFACTURING COMPANY, Lisbon, Ohio, has sold its business and trade name to American Chain Company, Bridgeport, Conn. H. F. Wright and W. F. Wright will continue in their respective divisions of sales and production of Wright products.

THEODORE BERAN, commercial vice-president of the General Electric Company in charge of the New York district, has submitted his application to retire from active business, effective May 1.

C. O. BARTLETT & SNOW COMPANY, Cleveland, Ohio, announces that it has appointed W. H. Norrington as its representative in New York City, and vicinity. Mr. Norrington will maintain his office at 30 Church Street.

TRICO FUSE MANUFACTURING COMPANY, Milwaukee, Wis., announces the removal of its Pittsburgh office to new and larger quarters at 405 Penn Avenue.

TIMKEN ROLLER BEARING SERVICE & SALES COMPANY, Canton, Ohio, announces the appointment of W. H. Post as manager of its Pittsburgh branch office.

MOBILE & OHIO RAILROAD has purchased three motor cars from the St. Louis Car Company and the Electro Motive Company, to replace steam equipment in the Montgomery district. The seats in the new gas-electric units face the rear, giving the passengers an unobstructed view. The cars are equipped with a new type of observation platform finished in brass, with the entire rear end of the car inclosed in glass.

ADVERTISING LITERATURE

PEREY MANUFACTURING COMPANY, New York, has issued a folder on the handling of New York City's after theater crowds with Perey turnstiles.

CROUSE-HINDS COMPANY, Syracuse, N. Y., has issued Bulletin No. 2112 on "Railway Mail Car Lighting and Fan Installations."

QUIGLEY FURNACE SPECIALTIES COMPANY, New York, N. Y., issued a new bulletin describing the Quigley bitumen gun, designed for shooting hot or cold materials as protective coatings on surfaces.



Proved Dependability

of any product is demonstrated by long years of satisfactory performance. This is particularly true of electric railway car equipment. The severe service strains to which such equipment is subjected is the yardstick by which its dependability must be measured.

"PEACOCK" STAFFLESS BRAKES

REG. U. S. PAT. OFF.



have been in use for many years on the cars of electric railways in this country and Canada. During these many years their performance has demonstrated beyond a doubt their superiority to any other hand brake. Their unfailing dependability has been proved by the industry.

Tremendously powerful, yet easy to operate, they are standard equipment on nearly all modern cars.

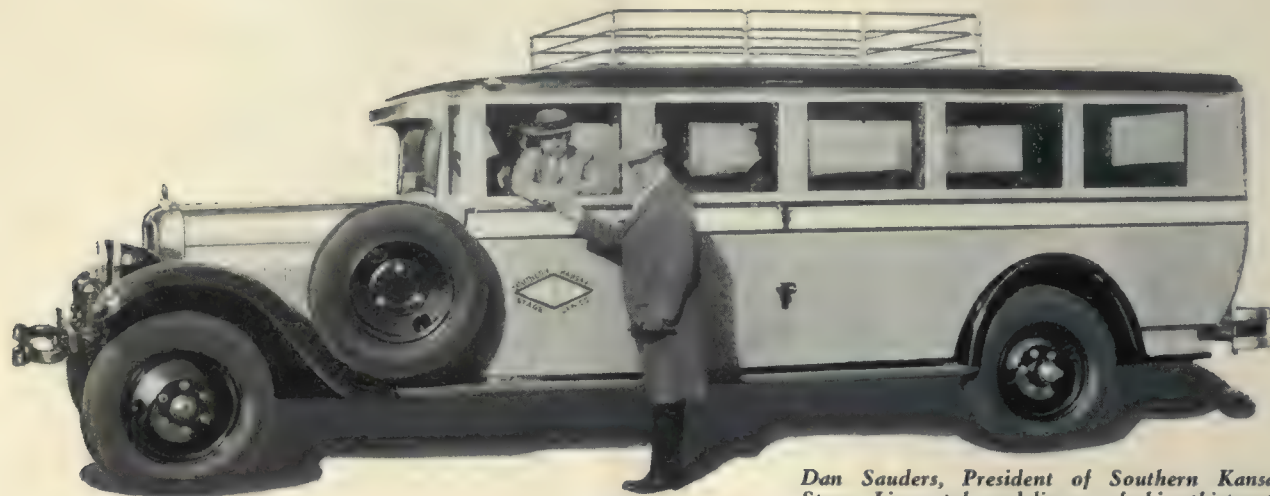
National Brake Company, Inc.

890 Ellicott Square, Buffalo, N. Y.

Canadian Representative

Lyman Tube & Supply Co., Ltd., Montreal, Can.

Replaces Motors in 5 other Busses with STUDEBAKER Engines— *That's what Sauders thinks of Studebakers!!*



Dan Sauders, President of Southern Kansas Stage Lines takes delivery of his thirteenth Studebaker. Southern Kansas Stage Lines' Studebakers are used over the unpaved routes in the territory because of their great power and dependability.

BECAUSE of the demonstrated dependability and great power reserve of the Studebaker six-cylinder motor, the Southern Kansas Stage Lines has replaced motors in five other busses of greater cost with Studebaker power plants. Certainly there can be no stronger testimonial of Studebaker satisfaction than this.

Studebakers used for hard jobs

Tremendous power and unfailing dependability were responsible for the selection of Studebakers for passenger service over 8 of the unpaved routes covered by the Southern Kansas Stage Lines. These routes total 750 miles, fifty per cent of which are dirt roads that offer severe handicap to all-weather operation.

Commenting on his Studebaker equipment, Mr. Dan Sauders, President of the company, says: "We are now operating 13 Studebaker busses on our unpaved routes. These units have mileage records ranging

from 50,000 to 150,000 miles and every bus is in excellent condition. Six of our Studebakers covered over 50,000 miles without one cent of repairs, except valve grinding. In all of our experience, we have yet to find any bus of similar capacity that can equal the downright dependability of Studebakers."

This is but one of the many reports recently received from operators of Studebaker busses—typical evidence of the satisfaction which Studebaker busses are giving.

Studebaker Bus Models and Prices

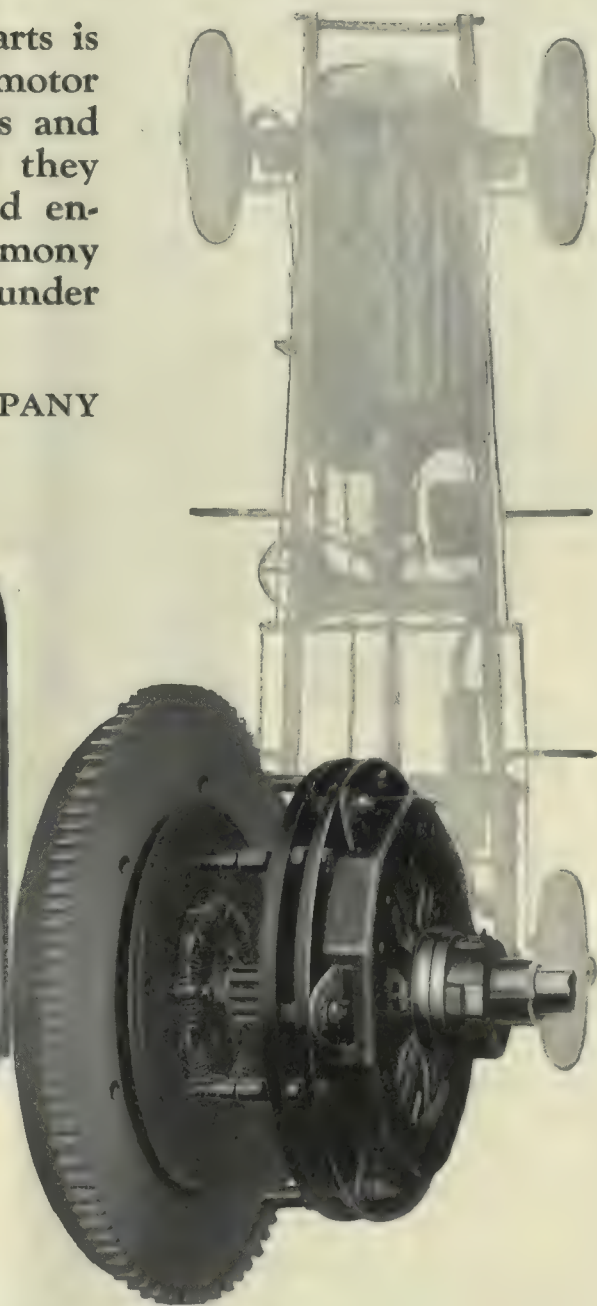
75 Junior Chassis—158-inch W. B.	
Chassis only, single or dual rear wheels	\$2410
15-Pass. Cross-Seat Sedan	4520
76 Special Chassis—184-inch W.B.	
Chassis only, single or dual rear wheels	\$2775
19-Pass. Cross-Seat Sedan	5275
20-Pass. Parlor Car De Luxe	6395
22-Pass. Seminole Observation Parlor Car	6395
75 Heavy Duty Chassis—184-inch W. B.	
Chassis only, dual rear wheels	\$3275
21-Pass. St. Car Bus	5895
All prices f.o.b. factory.	
Purchase can be arranged on Studebaker's liberal budget payment plan.	

The New Studebaker BUS CHASSIS

Co-ordination

Co-ordination of all operating parts is an admitted essential to efficient motor car performance. Long Radiators and Clutches fully demonstrate that they have been correctly designed and engineered to work in perfect harmony with all other operating units, under all conditions.

LONG MANUFACTURING COMPANY
Detroit, Michigan

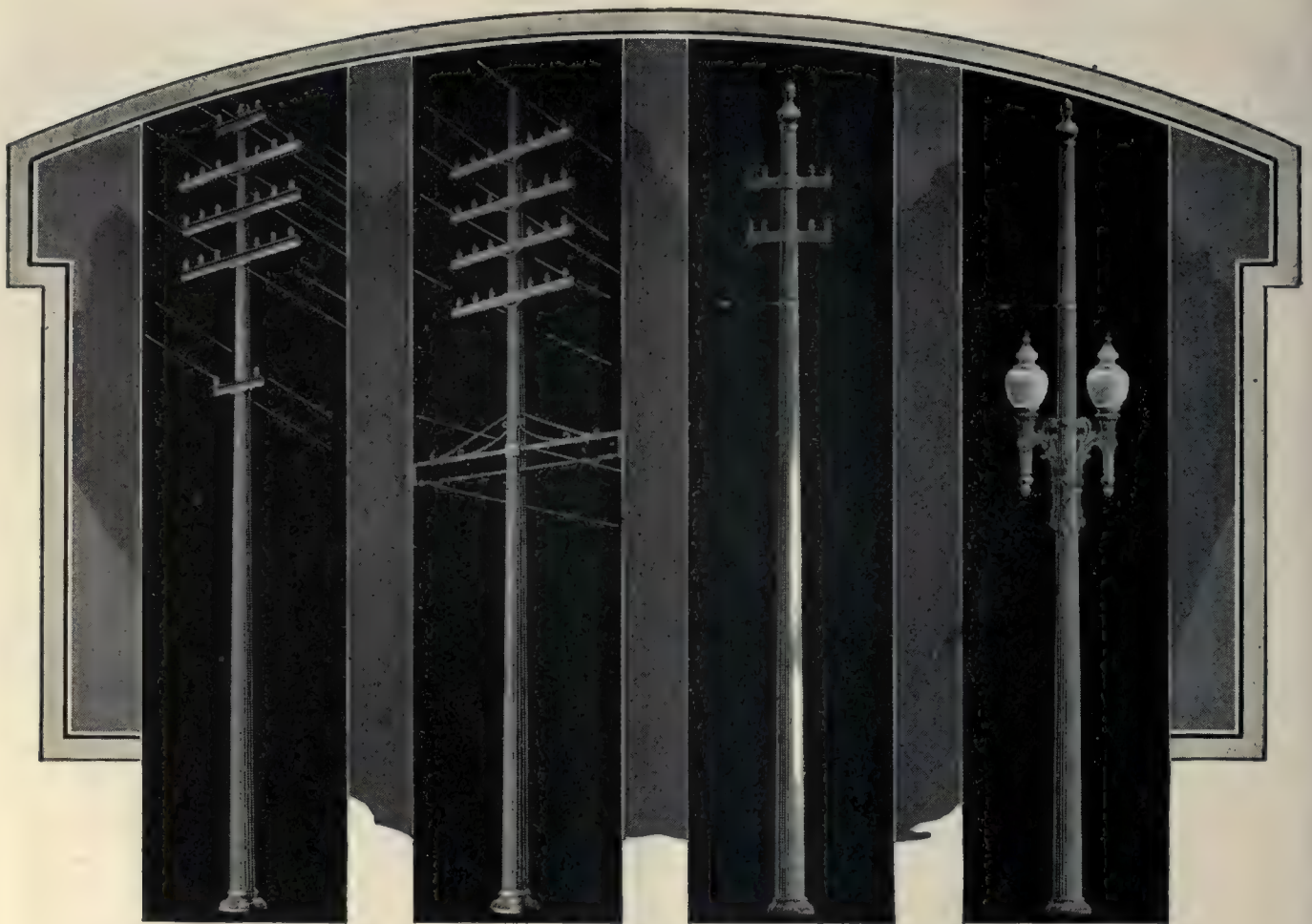


Radiator Division and
General Offices:
E. Grand Blvd. at Cameron

Clutch Division:
Dequindre at Halleck

LONG

LONG PRODUCTS—AUTOMOTIVE CLUTCHES AND RADIATORS



The "Ideal Pole" Becomes a Reality

IF a group of outstanding engineers were to draw up specifications of an "ideal pole" for carrying transmission and distribution lines, the result would be very similar to the Union Metal Fluted Steel Pole.

The greatest engineering advantages have been incorporated in this ornamental pole—and to these has been added beauty. The single shaft, viewed alone, is clean-cut and dignified, while the whole group of poles can be lined up with a result that is a pleasing contrast to the staggered appearance so often associated with old type poles.

It was only after years of research that the construction of Union Metal poles was completely worked out. Greater strength was

combined with light weight and resistance to transverse strains. The anchor rod construction, which does away with the burying of the pole in the ground, increases the speed of erection, allows for quick replacement and eliminates the hazard of ground line corrosion. Another outstanding advantage of this ideal pole is the exclusive Union Metal ventilation feature which guards against condensation and sweating.

Wherever wood, concrete, tubular steel or structural steel poles are used, Union Metal Fluted Steel Poles may be used with better results both structurally and artistically. Let Union Metal engineers consult with you in regard to any contemplated installation.

THE UNION METAL MANUFACTURING COMPANY

General Offices and Factory, Canton, Ohio

*Branches—New York, Chicago, Philadelphia, Cleveland,
Pittsburgh, St. Louis, Los Angeles, San Francisco, Jacksonville.*

UNION METAL

DISTRIBUTION AND TRANSMISSION POLES

102 YEARS OF MANUFACTURING EXPERIENCE

Rattan car seat webbing may be ordered through any H-W sales office



No. 327-M

FOR INTERURBAN NEEDS

THIS Heywood-Wakefield seat is designed for the modern type of interurban service where comfort is now so important. It has been selected for both new cars and for replacement use.

It has deep, double spring cushions shaped to allow more leg freedom. Mechanism rails are set in. The individual backs are properly pitched for comfort.

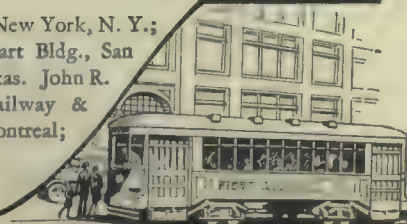
Our car seating experts will be glad to help you decide on the best seating equipment for your needs. This service is free through any H-W sales office.

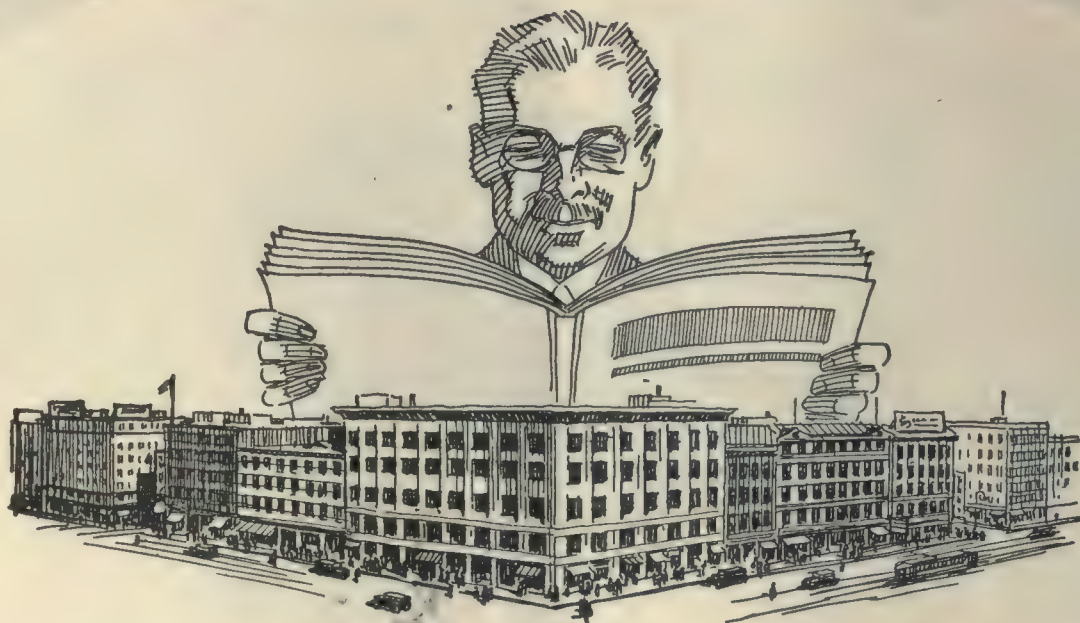
If you have not received a copy of our new Bus Seat Catalogue, write for it.



Heywood-Wakefield
REG. U.S. PAT. OFF.

Heywood-Wakefield Company, Wakefield, Mass.; 516 West 34th St., New York, N. Y.;
439 Railway Exchange Bldg., Chicago, Ill. H. G. Cook, Hobart Bldg., San Francisco, Cal. The G. F. Cotter Supply Company, Houston, Texas. John R. Hayward, Liberty Trust Building, Roanoke, Va. The Railway & Power Engineering Corp., 133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada.





He is your business partner

He considers first and foremost your interests.

He is truthful and honest in his dealings with you.

He is not provincial, but his experience is nation-wide in scope.

He is not opinionated, but brings to you unbiased facts, news, and reports.

He has a finger on the pulse of your trade's activities. He promulgates helpful information.

He is in close touch with manufacturers, producers, distributors—those from whom you buy.

He deals with none which has a tendency to mislead or which does not conform to business integrity.

He is a consultant that "sits in" with you regularly. His suggestions are profitable to you.

He holds a fellowship in a select association with exacting standards of membership.

He has pledged himself to determine the highest and largest function of the trade which he serves, and to strive in every legitimate way to promote that function.

HE IS THIS PAPER.

Your paper. A member of the Associated Business Papers, Inc.

THE ASSOCIATED BUSINESS PAPERS, Inc.

Executive Offices: 220 West 42nd St., New York, N.Y.

A. B. P.

The A.B.P. comprises a group of business papers that reaches 54 fields of trade and industry. Membership requires the highest standards in every department of publishing, circulation, editorial, and advertising.

The advertisers in this publication demonstrate by their presence here that they are awake to modern methods of selling as well as production—methods that cut costs and standardize operations.



900-D
Double Stationary
Chair
(without arm rest)



392-A
Walk Over Seat
with deep spring edge,
divided cushion and
divided concave spring
edge back.

Rider appeal— for the up-to-date city line!

CAR comfort is seat comfort. The car that attracts passengers from other up-to-date forms of transportation is the car that is fitted with seats designed to offer the greatest comfort and luxury.

Here are two of the many designs of H. & K. Seats which have created new passengers for progressive transportation companies. The 900-D Seat was selected for the 10 new Cincinnati, Hamilton and Dayton city cars and the 392-A Seat is installed in the 50 new cars of the Worcester (Mass.) Consolidated Railway.

Whether you are facing a new car problem or a rehabilitation program it will pay you to come to H. & K.—the headquarters for improved car seat design. Find out about the complete H. K. line available and ask us to help you select the design best suited. An H. & K. Representative will be glad to call on you.

HALE & KILBURN COMPANY

General Offices and Works: 1800 Lehigh Avenue, Philadelphia

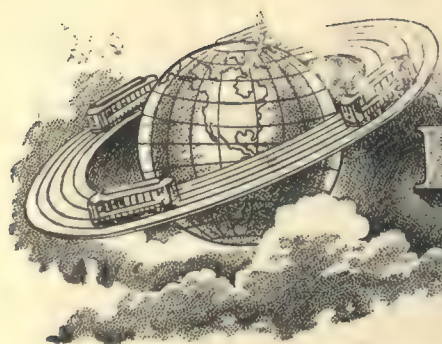
SALES OFFICES:

Hale & Kilburn Co., Graybar Bldg., New York
Hale & Kilburn Co., McCormick Bldg., Chicago
E. A. Thornwell, Candler Bldg., Atlanta
Frank F. Bodler, 903 Menadnock Bldg., San Francisco

T. C. Coleman & Sons, Starks Bldg., Louisville
W. L. Jefferies, Jr., Mutual Bldg., Richmond
W. D. Jenkins, Praetorian Bldg., Dallas, Texas
H. M. Euler, 146 N. Sixth St., Portland, Oregon

Hale and Kilburn SEATS

JUST as the electric railway companies have to compile and be guided by exhaustive statistics as to peak loads, traffic densities, costs per mile, and so forth, we must constantly keep ourselves informed as to purchasing power, density of population and all vital market information in order to maintain our service as an active asset of your service.



Barron G. Collier

INCORPORATED

CANDLER BLDG. NEW YORK

STANDARD AUTOMATIC SIGNAL-GATE

IS DIFFERENT
IN BASIC PRINCIPLE
FROM ANY CROSSING
GATE YOU EVER SAW

IT HAS THE POSITIVE
PROTECTIVE FEATURES
OF A MANUALLY OPERATED
GATE WITH THE LOW OP-
ERATING AND MAINTENANCE
COST OF AN AUTOMATIC
WARNING SIGNAL. IT IS
THE FIRST GATE EVER
DESIGNED THAT CAN BE
SATISFACTORILY CONTROL-
LED BY TRACK CIRCUIT

SEND FOR ILLUSTRATED LITERATURE!

Standard Automatic Signal Corporation, 208 S. La Salle St. CHICAGO



SALIH HAMATAK

The Arabian flower vender pleases some and annoys others by his sales phrase "Appease your mother-in-law" (Salih Hamatak).

It's impossible to find a standard phrase to please everyone, because humans are just as temperamental as electric machines.

And long ago operators learned that no standard carbon brush would make all machines work right.

They learned it through reading how Morganite provides a special grade for each service—that is guaranteed to make any machine turn from mother-in-law to mother.

Morganite

Brush Co., Inc.

Main Office and Factory

3302-3320 Anable Ave., Long Island City, N. Y.

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn. Ave.

Cincinnati, Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.

Cleveland, Electrical Engineering & Mfg. Co., 320 Union Building

Baltimore, O. T. Hall, Sales Engineer, 432 North Calvert St.

Revere, Mass., J. F. Drummey, 75 Pleasant Street.

Los Angeles, Electrical Engineering Sales Co., 502 Delta Building.

San Francisco, Electrical Engineering Sales Co., 222 Underwood Bldg

Toronto, Can., Railway & Power Engineering Corp., Ltd., 133 Eastern Ave.

Montreal, Can., Railway & Power Engineering Corp., Ltd., 68-70 St. Antoine St.

Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O. Box 325.



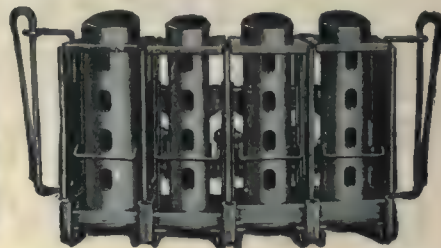
JOHNSON FARE COLLECTING SYSTEMS



Johnson Electric Fare Boxes and overhead registers make possible the instantaneous registering and counting of every fare. Revenues are increased 1½ to 5% and the efficiency of one-man operation is materially increased. Over 4000 already in use.

When more than two coins are used as fare, the Type D Johnson Fare Box is the best manually operated registration system. Over 50,000 in use.

Johnson Change-Makers are designed to function with odd fare and metal tickets selling at fractional rates. It is possible to use each barrel separately or in groups to meet local conditions. Each barrel can be adjusted to eject from one to five coins or one to six tickets.



Johnson Fare Box Co.

4619 Ravenswood Ave., Chicago, Ill.

Used and Surplus Equipment

INDIVIDUAL items of used equipment, or surplus new equipment, or complete plants, are disposed of (and found) through advertising in the *Searchlight* Section of this paper.

This is the section which so effectively aided the Government in selling the many millions of dollars worth of surplus material and equipment accumulated during the war without disturbing the market.

"SEARCHLIGHT"



*Cuts
like
bar!*

PAGE

Preformed STRAND

Think what it means to have Siemens Martin, High Strength and Extra High Strength strand that can be cut and handled like a single wire. No salvaging of the ends—no seizing—no kinking and unstranding. Splicing is much simpler. Dead end fasteners are more easily attached.

What is more, Page Preformed Strand lasts longer in service. Locked-up torsional stresses of stranding are eliminated, loads are distributed so you get the combined strength of all the wires. Prove these facts for yourself—your name and address brings a sample and informative booklet on Page Preformed Strand.



Manufactured under license arrangements with the American Cable Company, Incorporated, by

PAGE STEEL and WIRE COMPANY
BRIDGEPORT, CONNECTICUT



An Associate Company of the
American Chain Company, Incorporated
District Offices:
Chicago New York Pittsburgh
San Francisco

Bankers and Engineers

Ford, Bacon & Davis Incorporated Engineers

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation

Engineers—Constructors

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

43 Exchange Place

New York

STONE & WEBSTER

Incorporated

Design and Construction
Examinations Reports Appraisals
Industrial and Public Service Properties

NEW YORK BOSTON CHICAGO

THE BEELER ORGANIZATION

Transportation, Traffic, Operating Surveys
Better Service—Financial Reports
Appraisals—Management

52 Vanderbilt Ave.

New York

SANDERSON & PORTER ENGINEERS

PUBLIC UTILITIES & INDUSTRIALS

Design Construction Management
Examinations Reports Valuations

CHICAGO NEW YORK SAN FRANCISCO

ENGELHARDT W. HOLST

Consulting Engineers

Appraisals Reports Rates Service Investigation
Studies on Financial and Physical Rehabilitation
Reorganization Operation Management

683 Atlantic Ave., BOSTON, MASS.

ALBERT S. RICHEY ELECTRIC RAILWAY ENGINEER WORCESTER, MASSACHUSETTS

REPORTS - APPRAISALS - RATES - OPERATION - SERVICE



BYLLESBY ENGINEERING AND MANAGEMENT CORPORATION



231 S. La Salle Street, Chicago

New York

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C. E. BUCHANAN President W. H. PRICE, JR. Sec'y-Treas. JOHN F. LAYNG Vice-President
BUCHANAN & LAYNG CORPORATION
Engineering and Management, Construction
Financial Reports, Traffic Surveys
and Equipment Maintenance
BALTIMORE 1004 Citizens National Bank Bldg. Phone: Hanover 2142 NEW YORK 49 Wall Street

DAY & ZIMMERMANN, INC. ENGINEERS

DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT

NEW YORK

PHILADELPHIA

CHICAGO

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction
43 Cedar Street, New York City

WALTER JACKSON

Consultant on Fares and Motor Buses

The Weekly and Sunday Pass—Differential

Fares—Ride Selling

Holbrook Hall 5-W-3

160 Gramatan Ave., Mt. Vernon, N. Y.

KELKER, DELEUW & CO.

CONSULTING ENGINEERS

REPORTS ON

Operating Problems Valuations Traffic Surveys

111 W. Washington Street, Chicago, Ill.

McCLELLAN & JUNKERSFELD

Incorporated

ENGINEERING AND CONSTRUCTION

Examinations—Reports—Valuations

Transportation Problems—Power Developments

68 Trinity Place, New York

Chicago

St. Louis

E. H. FAILE & CO.

Designers of

Garages—Service Buildings—Terminals

441 LEXINGTON AVE.

NEW YORK

THE P. EDWARD WISH SERVICE

50 Church St.
NEW YORK

Street Railway Inspection
DETECTIVES

131 State St.
BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of
Water Tube Boilers
of continuing reliability**

BRANCH OFFICES

ATLANTA, Candler Building
BOSTON, 80 Federal Street
CHICAGO, Marquette Building
CINCINNATI, Traction Building
CLEVELAND, Guardian Building
DALLAS, TEXAS, Magnolia Building
DENVER, 444 Seventeenth Street
DETROIT, Ford Building
HOUSTON, TEXAS, Electric Building
LOS ANGELES, Central Building
NEW ORLEANS, 344 Camp Street



WORKS
Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893**

BRANCH OFFICES

PHILADELPHIA, Packard Building
PHOENIX, ARIZ., Heard Building
PITTSBURGH, Farmers Deposit Bank Building
PORTLAND, ORE., Failing Building
SALT LAKE CITY, Kearns Building
SAN FRANCISCO, Sheldon Building
SEATTLE, L. C. Smith Building
HONOLULU, T. H. Castle & Cooke Building
HAVANA, CUBA, Calle de Agular 104
SAN JUAN, PORTO RICO, Royal Bank Building

The Age of The Specialist

In medicine
In law
In engineering

Engineering service can bring
to the transportation business
the skilled touch of specializa-
tion, trained along lines that
often prove invaluable to the
client.

W. H. Sawyer
PRESIDENT

STEVENS & WOOD, Incorporated
Engineers and Constructors
120 Broadway, New York
Chicago . . . Youngstown, O.

A Personalized Service

Waterproofed Trolley Cord

The finest that science and skill can produce. For endurance,
economy and positive satisfaction, use Silver Lake A.

SILVER LAKE COMPANY



Newtonville
Mass.

Manufacturers of bell, trolley, signal and other cords.

NACHOD & UNITED STATES SIGNAL CO. INC.

LOUISVILLE, KY.

BLOCK SIGNALS

FOR

ELECTRIC RAILWAYS

HIGHWAY CROSSING SIGNALS



BELL NORTHERN CEDAR POLES WESTERN

BUTT TREATING
ALL GRADES

TIES

BELL LUMBER CO., Minneapolis, Minn.

Efficient Bus Heating with

The N-L Venti-Duct Heater

THE NICHOLS-LINTERN CO.
7960 Lorain Ave. Cleveland, Ohio

EIGHT WORKS
RAMAPO-AJAX-ELLIOT
MILBURN, NEW YORK
NIAGARA FALLS, N.Y.
CHICAGO, ILLINOIS
EAST ST. LOUIS, ILL.
PUEBLO, COLORADO
SUPERIOR, WISCONSIN
LOS ANGELES, CAL.
MONTREAL, QUEBEC
SARASOTA

Ramapo Ajax Corporation
RAMAPO AUTOMATIC
RETURN SWITCH STANDS
FOR PASSING SIDINGS
TEE RAIL SPECIAL WORK
MANGANESE WORK A SPECIALTY
SALES OFFICES AT ALL WORKS
Main Office, MILBURN, N. Y.

Coin Counting and Sorting Machines

FARE BOXES

Lever-Operated and Slip Change Carriers

The Cleveland Fare Box Co.

Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd., Preston, Ont.

CREOSOTED

Railroad Cross-ties; Switch-ties; Bridge Tim-
bers; Construction Timbers; Mine Timbers;
Lumber; Piling; Poles; Posts and other
Forest Products

J. F. Prettyman & Sons
Wood Preserving Plant
Charleston, S. C.



Rod, Wire and Cable Products

ANACONDA COPPER MINING COMPANY
THE AMERICAN BRASS COMPANY
General Offices - 25 Broadway, New York

ANACONDA TROLLEY WIRE

Bring your cleaning up-to-date!

CLEANING with gasoline or strong caustic solutions is slow, inefficient, and in the case of gasoline, involves a serious fire hazard as well.

Bring your cleaning up-to-date by doing it the Oakite way. Use safe, speedy Oakite materials for removing dirt and muck from car wheels, journal boxes and trucks; for washing cars inside and out; for doing *all* your cleaning. They will save you time and labor, eliminate a lot of hard scrubbing, and do a more thorough job besides. Oakite materials are the last word in cleaning efficiency!

Write for booklet "Oakite in Railroad and Car Shops." It gives the facts.

Oakite Service Men, cleaning specialists, are located in the leading industrial centers of the U. S. and Canada

Oakite is manufactured only by

OAKITE PRODUCTS, INC., 28B Thames St., NEW YORK, N. Y.

OAKITE

Industrial Cleaning Materials and Methods



Double Register
Type R-11

International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

The International Register Co.
15 South Throop Street, Chicago, Illinois

Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.



COLUMBIA

Railway Supplies and Equipment

Machine and
Sheet Metal Work

Forgings
Special Machinery
and Patterns

Grey Iron and
Brass Castings

Armature and
Field Coils.

The Columbia Machine Works and M. I. Co.

265 Chestnut St., corner Atlantic Ave.,
Brooklyn, New York

Advertisements for the Searchlight Section

Can be received at the New
York Office of Electric
Railway Journal
until 10 a. m.



Wednesday

For issue out Saturday

0220

ELRECO TUBULAR POLES



THE "WIRE LOCK" THE CHAMFERED JOINT

Lowest Cost
Least Maintenance

Lightest Weight
Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge \$2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....\$4.50 an inch
3 to 7 inches.....4.30 an inch
7 to 14 inches.....4.10 an inch
Rates for larger spaces, or yearly rates, on request.
An advertising inch is measured vertically (a) one column, 3 columns—30 inches—to a page.

Make your used equipment help cut the cost of replacements!

❑ Used Railway Equipment—cars, rails, poles, appliances, road building equipment, etc.—that you consider of no further value in your service, may just fit the need and purpose of some other organization in the field of electric railway operation.

❑ There's always a market for used railway equipment somewhere. Don't make the mistake of junking equipment that you consider of no value, when there's a possibility of turning it into cash to be applied against the cost of replacements—that's not good business. Send us a list of the equipment you wish to dispose of to be advertised here. Over 6,000 executives and officials in the electric railway field watch the Searchlight Section for opportunities to purchase used equipment.

Advertise it in the—

SEARCHLIGHT SECTION

POSITIONS WANTED

EQUIPMENT superintendent, experienced and successful on maintenance of electric car and bus equipment, desires to change, can get you the desired results; references. PW-106, Electric Railway Journal, 7 South Dearborn St., Chicago, Ill.

SUPERINTENDENT transportation; well known in electric railway field, with broad experience, successful record city, interurban railways and buses, available short notice, correspondence invited. Fine references. PW-103, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

WANTED—Position as manager, general superintendent or M. M. of electric railways. Can qualify in every way. PW-99, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

WANTED—Position with a supply company by a man who has been introducing and selling railway devices for the past fifteen years; knows every railway official in the country; an interview solicited. Fred W. Roth, 225-03—137th Avenue, Laurelton, Long Island, New York.

EXCEPTIONAL OFFERING!

16 Modern, Light-Weight, Steel, Center Entrance, Trailer Cars. Virtually new!

FS-107, Electric Railway Journal
Guardian Bldg., Cleveland, Ohio

FOR SALE

MOTORS

130 Westinghouse, Type 514-C.
Fine condition. Low price.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

"SEARCHLIGHT"

IS
Opportunity Advertising

—to help you get what you want.

—to help you sell what you no longer need.

Take Advantage Of It

For Every Business Want

"Think SEARCHLIGHT First"

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue
This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Advertising, Street Car
Collier, Inc., Barron G.

Air Brakes
General Electric Co.
Westinghouse Traction
Brake Co.

Anchors, Guy
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Works
Elec. Service Supplies Co.

Automatic Return Switch
Stands
Ramapo Ajax Corp.

Automatic Safety Switch
Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Cincinnati Car Co.
Westinghouse E. & M. Co.

Axles (Front & Rear) Motor
Truck & Passenger Car
Timken Detroit Axle Co.

Axles, Trailer & Motor Bus
Timken Detroit Axle Co.

Babbitting Devices
Columbia Machine Works

Badges and Buttons
Elec. Service Supplies Co.
International Cash Register
Co., The

Batteries, Dry
Nichols-Lintern Co.

Bearings, Anti-Friction
Timken Roller Bearing Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Westinghouse E. & M. Co.

Bearings, Center and Roller
Side
Cincinnati Car Co.
Columbia Machine Works
Stucki Co., A.

Bearings, Roller
Timken Roller Bearing Co.

Bearings, Thrust
Timken Roller Bearing Co.

Bells and Buzzers
Consolidated Car Heating
Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
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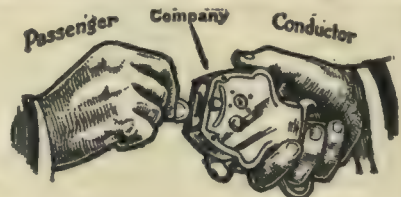
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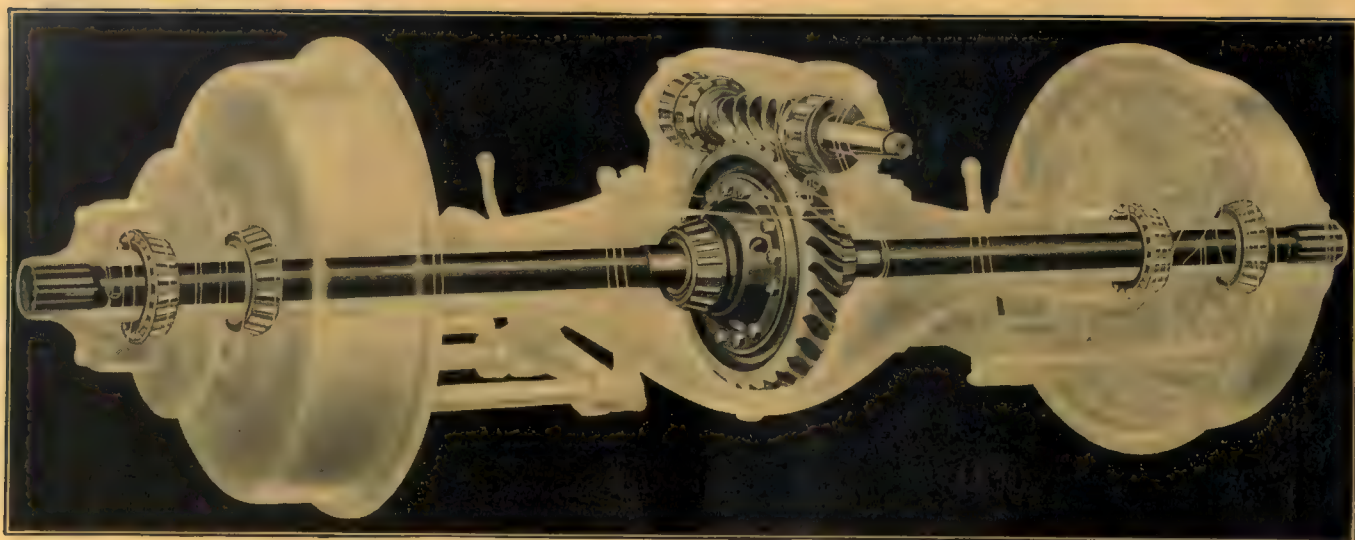


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